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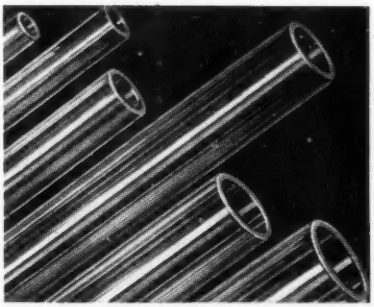

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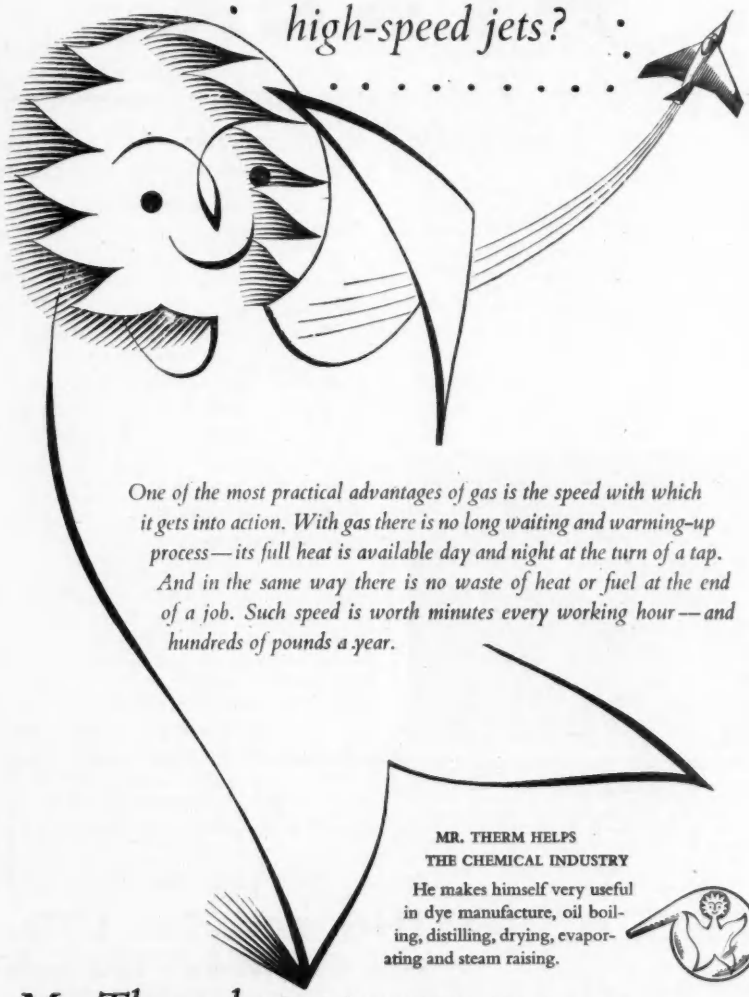

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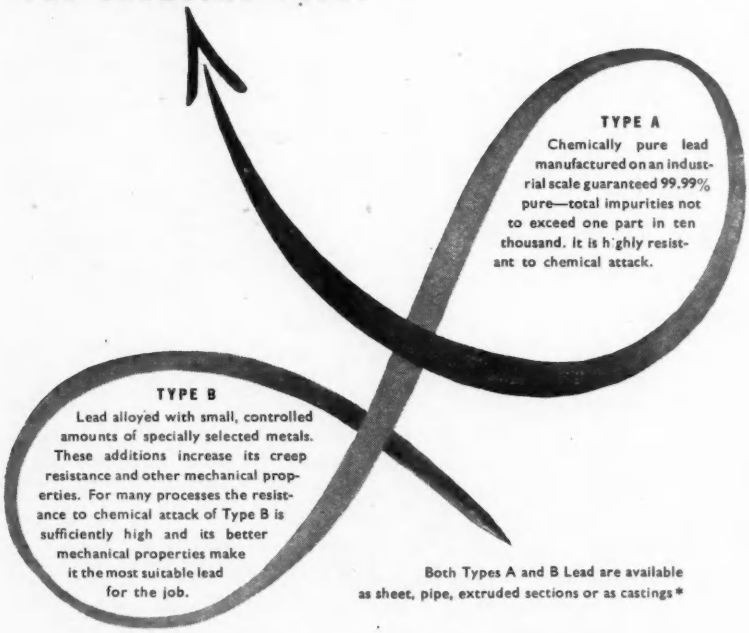
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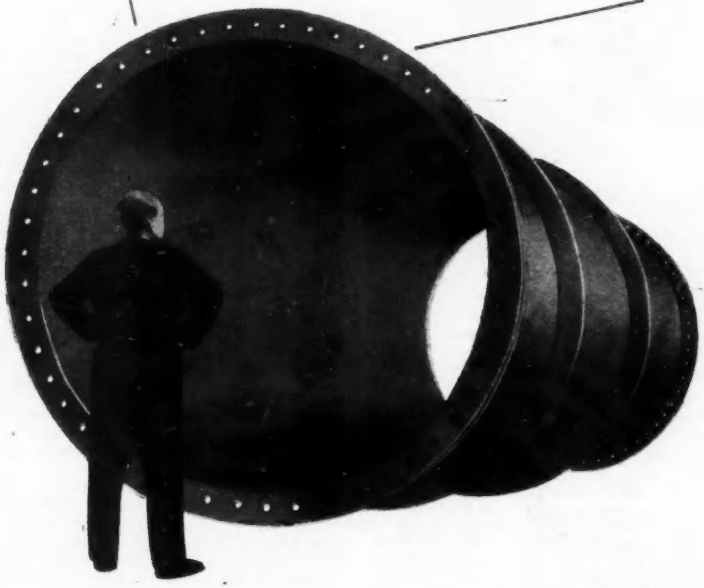

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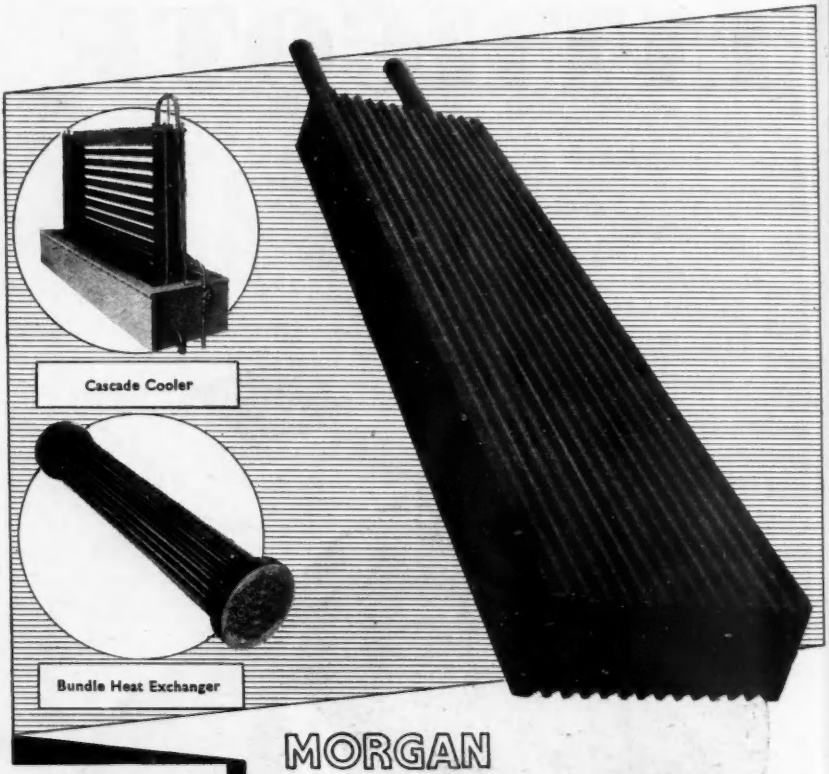

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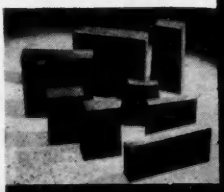

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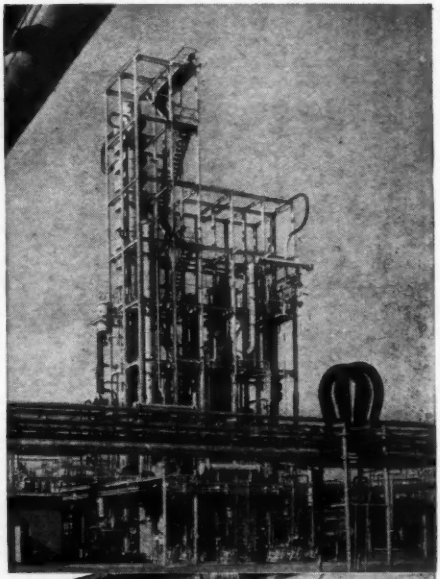

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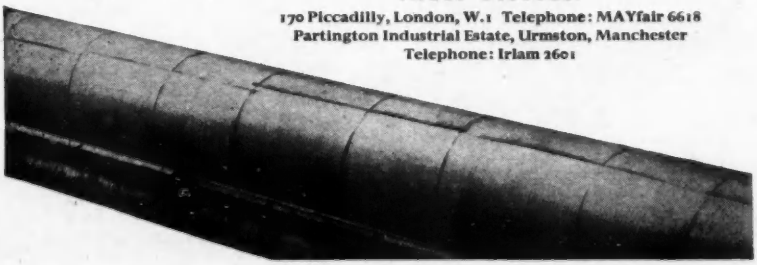

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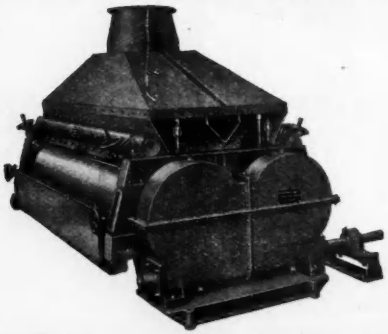

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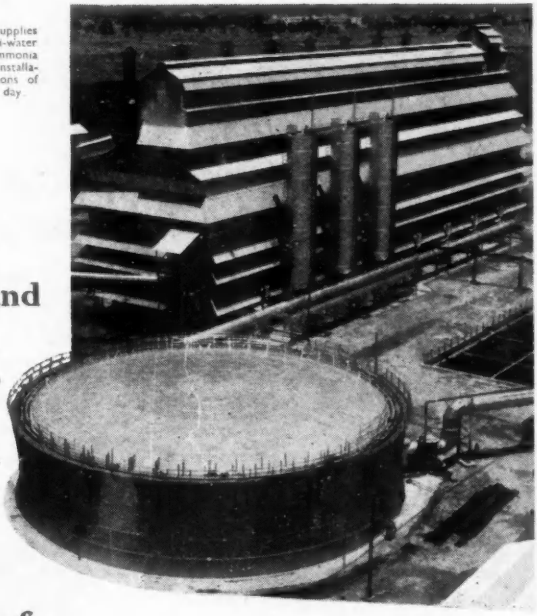

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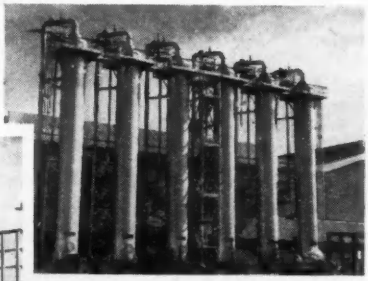

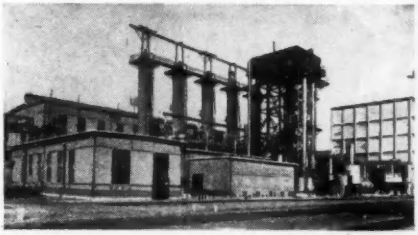

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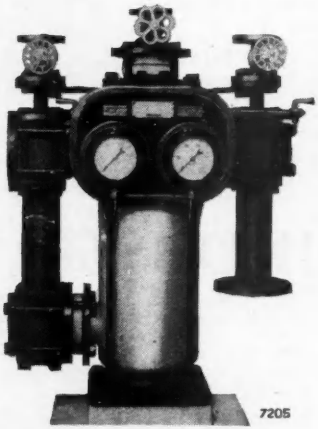

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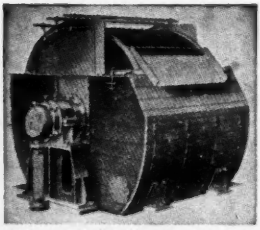

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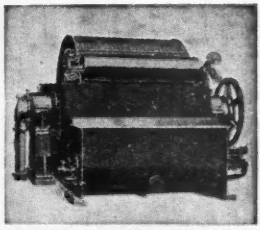

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Volume LXVII 12 July 1952 Number 1722

Society Life

IT is not inappropriate at the present time to devote these comments to the activities and problems of our chemical societies. For currently the Society of Chemical Industry is in Aberdeen for its 71st annual meeting; and although the Royal Institute of Chemistry held its 74th such meeting more distantly in Dublin and in April, the printed record of its deliberations has only just been circulated in the RIC Journal for June. In human life the seventies are reached with some considerable shedding of vigour; even when prudence does not decide this in advance, the inescapable facts of personal biochemistry almost invariably dictate it. But one of the primary reasons underlying man's instinct for forming groups and clubs and societies is the desire to escape from his own mortality, to ensure that his own aims and interests shall endure though he himself cannot. If the organised societies of knowledge and professions themselves show signs of age, they are failing in one of their most important purposes. Yet nothing is easier, for clubs and societies tend to acquire inflexible traditions as insidiously as man himself develops hardened arteries. At this turn of a revolutionary century these two important organisations of chemists are facing their septuagenarian years at a most difficult testing time.

The publication of original research papers has long become one of the principal responsibilities of scientific societies and institutions. It is desirable that this method and its principle should continue for there seems no better way of ensuring the freedom that is indispensable to scientific objectivity and originality. The resources of the State and of industry may be much greater but only the most ingenuously wishful thinker would want to see responsibility of publication passing from scientists' own societies to bodies that must finally account for their actions to taxpayers or shareholders. Nevertheless, the costs of publication and the volume of material requiring publication have risen alarmingly and the resultant strain upon the modest budgets of societies is more alarming still.

There is perhaps no better test of youth and vigour than the capacity to withstand severe strain; if so it is a test from which the Royal Institute and the Society of Chemical Industry so far emerge satisfactorily. Both, and especially the latter, whose publishing activities have always been much greater, have met the crisis of rising costs by flinging greater allocations of money into

the task. If expensive plans formed a few years ago have not been fully realised, there has still been expansion. In 1951 the Society of Chemical Industry increased the number of pages in weekly and monthly publications by more than 60 per cent over the number of pages in 1950. It would be grossly unfair to say that this merely reflected the greater availability of paper; in 1948 or 1949 such a comment might have been commonsense in anticipation of events, but money has since become the dominant factor. In 1950 the Society's publications cost £57,717; in 1951 the figure rose to £70,267. Comparisons with earlier years would show even greater differences. For example, the Royal Institute's Journal in 1946 cost £1,061; in 1951 it cost £3,072. However commendable it is for our societies and institutions to pursue a vigorous publishing policy, the financial consequences are severe. To recognise this is to realise the courage that is being shown by their Councils. Unless costs fall—and it seems doubtful whether those for printing can fall, even though paper itself may become less dear—the outlook is disturbing. The financial limit seems to have been reached. If this interpretation of balance sheets is correct, then the limit of expansion in publishing activities has also been reached. Should the onus for finding more revenue fall upon scientists themselves? At a time of rising costs in all directions and when taxation scarcely relents its intimate toll, subscriptions cannot be further increased without pain and perhaps without some loss of membership.

Another major function of these organisations is to act as centres for the 'mixing' of scientists. With specialisation relentlessly intensifying, this is a function of increasing importance. It is satisfying to see that in the annual reports of both organisations greater local section activity has been recorded. It is true that the development of subject groups and subject panels by the Society of Chemical Industry tends to increase the extent to which scientists are segregated, but there does not seem to be any consequential weakening in the vigour of local sections. So far at any rate the Society is managing to maintain 'the best of both worlds.' However, from another viewpoint the creation of more and more specialised groups is a laudable sign of youth and adaptability. Nothing is nationally needed now and in the years ahead more than technological awareness and progress. On the whole the new groups of the SCI are technological groups and in encouraging their increasing formation the Society is not only keeping pace with current needs but is striding forward to meet the future. Here certainly there is no sign of elderly conservatism.

If chemists must remain mortal—though in this century many of their discoveries have lengthened the expectable span of human life—it is certainly clear that these societies they have formed are as yet showing none of the symptoms of mortality. For them the seventies are youthful, expansive, and ambitious; perhaps, too, their ever-pressing economic problems are typical problems of vigorous youth.

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Notes & Comments

Soil Conditions

WHATEVER misgivings we and many other critics may have about the speed with which chemical soil-conditioning polymers are being put on the market, the steady release of scientific information about these substances, especially the publication of private research results, must be warmly welcomed. The paper by R. M. Hedrick and D. T. Mowry appearing this month in *Chemistry & Industry* (1952, 5 July, 652-656) and originally read in late May to the Agriculture and Plastics Groups, is probably the most informative contribution yet to emerge on this side of the Atlantic. As so much competition has followed the Monsanto Chemical Corporation's initial announcement of Krilium, this organisation's continued determination to make their research results public with as much speed as normal channels allow deserves the highest praise. The temptation to retreat into a shell of secrecy must have been very strong; even if Monsanto have been forced to hasten their commercial development plans, which is quite as understandable as it is regrettable, there seems to be no intention to withhold vital information though this is likely to help the camp-following competitors whose activities have already done no little harm to the long-term prospects of these new soil-improving chemicals. Clearly enough, the Monsanto Corporation believes that the informed co-operation of soil scientists outweighs the immediate advantages of scientific secrecy.

The Opposite Effect

THIS is all to the good. But the extent to which rapid commercialisation of the 'idea' has been all to the bad in the United States can be gathered from these cynical lines recently published in a critical letter to that well-known American publication, *Chemical Week*.

'For gardening try Supercillium
When added to soil
Brings it to a boil
Thus first grows, cooks, then eats,
Digests and repeats
All vegetables, grass, and Sweet
William.'

This reaction to 'the advent of a new conditioner every other week' gives some idea of the exaggerated publicity that is accompanying some of these excursions into a new and potentially important market.

Nature Trips Up?

AMONG the welter of discussion for and against the fluoridation of natural water supplies, a small paragraph in the *Lancet* recently may serve to put in its proper perspective the idea that Nature's good water is perfectly all right provided the chemists will only leave it alone. Research on the effects of trace elements in water has not been confined to fluorine, and one of the elements investigated has been selenium. This substance occurs to varying extents in soil, of which it is a normal constituent, but a small amount of work done in the U.S.A. has gone to show that its presence may make teeth more liable to dental caries than they would be without it. The most reliable guide to the amount of selenium taken into the system is its rate of excretion in the urine, and a study of two groups of children in neighbouring counties in the U.S.A., undertaken to find out why one group had the best and the other the worst teeth in the State, found that the only difference between the diets of the two groups was in the amount of selenium present in each. The conclusion that selenium leads to remarkably bad teeth has also been reached by Smith *et al.* in 1946. Work such as this not only suggests that our knowledge of the mechanism of tooth decay is far from complete, but also that fluoridation is neither so black nor so white as some would have us believe.

Works Safety

THE huge Du Pont chemical business may have had to face charges of monopoly or near-monopoly practices under America's anti-trust laws, but it has achieved another kind of monopoly that deserves wider attention. For the tenth year in succession, Du Pont have received the U.S. National Safety Council's highest industrial award, a record unmatched by any other American company. Does this mean that industrial size is the natural background for industrial safety? This possible conclusion is fortified by some National Safety Council statistics, which show that small companies employing less than 500 workers per business have twice as many accidents as big companies, although totally these under-500 companies account for only half the working force. As a fact, therefore, safety and size seem to go together. Nevertheless, the principle need not be valid. The Du Pont organisation has 100 separate operating plants: two-thirds of these employ less than 500 workers, one-quarter of them less than 100. Each unit has its own separate safety system; Du Pont's central safety division acts in an advisory capacity and has no direct authority or control. Thus, the main reason why safety and size have coincided would seem to lie in the capacity of the large central organisation to create a department solely concerned with safety measures. The existence of this section obviously ensures a high degree of safety-consciousness throughout the organisation. In all discussions safety aspects of processes and plant operation must be on the agenda.

Safety and Economy

THE assumption that industrial size enables the costs of a specialised safety department to be spread over a big total turnover should not be pressed too hard. Its validity is greater on paper than in fact. For two reasons Du Pont's safety-measure consciousness is a costless and perhaps even profitable part of the Du Pont budget. One reason is that the safest way of operating a process is generally also the most efficient. The other is that 'absenteeism' due to personal injuries or industrial illnesses is minimised, a saving that pays much of the cost for safety measure study and development. There is a third reason of a more indirect nature. Insurance companies base their rates upon a company's previous record and a good record produces significant savings in premiums. Intensive attention to safety is, in fact, good business. Small organisations might not be able to establish safety departments, but the smaller range of problems in safety will in general be well within the capacity of one executive. Specialised advice for small factories and companies might well be regarded as one of the technological functions of industrial associations. Persistent attention to works safety along these lines would remove all risk that the standard of safety in small works tends to be lower than in large industrial organisations.

The Last Tram

THE end of the London trams—the last 200 of them ended their journeys last weekend—provides the opportunity for a personal note that will interest many of our readers, for it was Sir John Williams Benn who carried the long struggle to give London an efficient publicly controlled traffic system to a successful issue just about 50 years ago. Sir John Benn founded the business of Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, and he was 'Father' of the L.C.C. for many years. The first electric tramway owned by the L.C.C. was inaugurated on 15 May, 1903, by the then Prince of Wales (King George V), who was accompanied by the Princess and their two sons. John Benn, who was chairman of the Highways Committee, had a prominent part in the ceremony which, he said, marked the start of the first people's motor carriage at the modest fare of a halfpenny, and 'their Royal Highnesses had graciously determined to emphasise that important financial fact by paying their halfpennies.' Sure enough, before the Prince set in motion the first tramway car for the journey from Westminster Bridge to Tooting the Royal travellers handed over the four coins—halfpennies, mark you—John Benn collecting their fares, but omitting to punch the tickets!

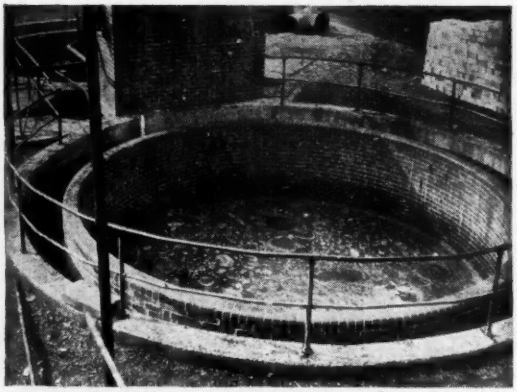
Monsanto Chemicals Develop Biological Purification

THE problem of preventing the pollution of rivers by industrial wastes—particularly those from large chemical factories—has grown in seriousness since the war and effluent disposal is now one of the biggest headaches facing the chemical manufacturer. Some of the finest brains in the engineering and chemical professions have been grappling with the problem for years and yet complaints from local authorities, angling societies, etc., seem to increase. It was, therefore, with very great interest that a large party of chemists, engineers and journalists accepted the invitation of Monsanto Chemicals Limited to visit the effluent purification plant at their Ruabon factory on 27 June.

This factory, which produces nearly 200 chemicals, including synthetic phenol, cresylic acids, acetylsalicylic acid, benzoic acid, rubber chemicals, etc., is situated in the village of Cefn Mawr, near Ruabon, on the fringe of the industrial belt of the Denbighshire coalfields, overlooking the vale of Llangollen and some of the most beautiful scenery in North Wales. It is also situated near the River Dee which is one of the finest trout and salmon fishing streams in Britain. Effluent disposal has, therefore, been a serious problem for many years and it would have interested the visitors merely to see an ordinary purification plant. On 27 June, however, it was revealed that Monsanto had developed an entirely new method for treating man-made organic waste—biological destruction in percolating filters.

In welcoming guests, Mr. E. A. O'Neal, Jnr., chairman and managing director of Monsanto Chemicals, Ltd., said the company had invited them to see what they believed was a new development in the industrial field in Britain—a biological purification plant for chemical waste liquors of non-biological origin. When he had come over to this country in 1945 he had laid forward plans for the Company and top priority was given to the elimination and treatment of waste from the Ruabon factory. This was important because this particular factory was the key to the Company's success as a profitable venture. The country's economic needs demanded urgent and continued expansion of production whereas the waste problem had already been exaggerated as a result of the war. The task

A good general view of the plant



One of the two strong effluent neutralising pits each of 20 feet diameter and 20 feet deep. They are built within outer pits to prevent leakage

of ensuring that the River Dee was at no time polluted caused great difficulties.

The factory was and had been for over 50 years, the major employer in the area. It provided employment for well over 2,000 people—or one out of every three men registered in the area of Ruabon, Cefn Mawr, Acrefair, Vroncysyllte and Trevor. The well-being of the locality was therefore bound up in the well-being of the factory. Output in 1951 exceeded £6,000,000 of which 40 per cent was direct exports, and they estimated that 75 per cent was direct and indirect exports combined.

Basically, development of the present waste control scheme had followed two principles:—

1. Elimination of waste in production by increased efficiency in the process and/or recovery of waste by-products.

2. The treatment of waste liquors and waters to purify these to the degree that they could be returned to the River without affecting the quality of the water in the stream, or its amenities.

The type of plant they were to see, which was entirely new to the chemical industry, had set a very high standard in the development of control of waste, but even so it was not a job one could sit still on. Constant research and engineering would take place and further additions to plant would be made whenever found necessary because of the expansion of the works.

They were now recovering into usable products (although not necessarily profitable ones) some 9,600 tons per year. Efficiencies had improved and would continue to do so.

To date they had spent some £200,000 in research, development and pilot plant work and about £400,000 in civil engineering and equipment. As was usual in the development of a new plant, a lot of this expenditure had had to be written off, so that the plant they would see could probably be duplicated at a cost of £300,000. So, although the firm did not want to be taken as philanthropists, they felt they had not only provided a scientific contribution towards solving a major industrial problem in Britain, but might also have saved those in British industry who could use their development, considerable expense.

He would like to add that while his company had been pioneering the purification of waste waters, there had been concerted efforts in parallel to procure proper use of the waters of the River Dee for the greatest national good—he was referring to the Bala Lake Scheme. The measure of co-operation which had existed between Government Departments, including the DSIR, the local authorities and those already enjoying the fruits of the river was a happy omen that the interests of all who must have pure water supplies and who liked to enjoy to the full the amenities of the River would be fully protected.

Mr. O'Neal then called upon Sir Ben Lockspeiser, K.C.B., F.R.S., secretary of the Department of Scientific and Industrial Research, to give his reactions to the work. Sir Ben and his assistants, he said, had taken great interest in the plant and had been of great assistance.

Sir Ben said that it was always a pleasure

to come and see the work of Monsanto Chemicals Limited and to participate in the friendly and very good relations which he found always existed amongst members of their staff.

He had known Edward O'Neal for some years and Mr. O'Neal had always tried to persuade him that he was interested solely in making chemicals. Lots of people were always trying to tell him that they were only interested in making something but he often found that they were more interested in something else. He was not at all sure that Edward had not decided that he could fish and make chemicals at the same time. He had spent the previous night with Mr. O'Neal and he had not been shown chemicals—no, he had been shown a 17¼ pound salmon that had been caught in the River.

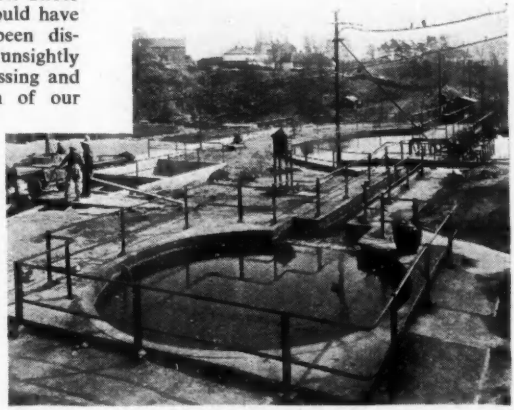
He was very pleased to be there because his department (through the Water Pollution Research Laboratory) was keenly interested in water pollution. He had seen a high-class piece of work.

Tremendous differences had come about recently, primarily through the application of science to industry. There had been tremendous increases in the standard of living and the way in which we lived had been greatly altered. Monsanto Chemicals were an example of a company which was always willing to take advantage of new knowledge. It played its part in obtaining new knowledge and played its part in adapting knowledge for practical purposes.

Almost all industrial processes involved the production of products which no one wanted—wastes, usually solid wastes. Those who had come up on the train would have seen how the countryside had been disfigured by solid wastes—mounds of unsightly material. But perhaps more distressing and even alarming was the pollution of our rivers by industrial wastes. Effluent had been discharged for many years into the rivers, of which there were hundreds of miles in this country. They had once been a great joy and pleasure. Now they were often horrible, ugly and in some cases they stank merely because people discharged into them what they did not want. If this situation continued the river system of the country would be ruined. This was not a new problem but it was one which was extremely difficult to solve. Until recent legislation even the legal position had been extremely complex.

Although the law might assist control it did not in itself make progress. Scientific knowledge, assisted by engineering skill was the only solution. This was a unique example. Monsanto had deliberately set about solving the problem and had adopted biological means to destroying organic wastes of non-biological origin. This, he believed, was a new approach. The knowledge of biological treatment of sewage was not new but the application—the engineering, etc.—to the disposal of man-made organic waste was new. It was the best knowledge they had of the subject and represented the best kind of chemical engineering and science. As a matter of principle he doubted whether it was perfect, but he had been told that Monsanto would not stop there and he was sure that there would be improvements. As an engineer he could say that the project bore all the marks of high-class engineering and technology.

The work which had been done was im-



The existing mixing chamber and 130,000 gallon clarifier. This is to be replaced by a new one now under construction

The two 2,500,000-gallon storage lagoons looking South-West across the River Dee

portant to the country because unless we looked ahead and saw to it that the best that science could offer—the best that the scientist and engineer could do—unless they could make better products and make them before anyone else—this country could not prosper.

The United Kingdom used to make the finest products in the world and to some extent it still did. There were some firms which still led the world. But we now had very sharp competitors—people who were quick to apply science. We were finding it difficult to make and export enough to be able to import half of our food.

In the microbiological field he felt that a great future lay for the chemical industry. Did we want to throw things away? Man was a very wasteful creature. He might not be able to be so much longer. We must begin to ask ourselves 'What are we throwing away?' Many people were throwing away things which might be turned into useful products. Could we use microbiology to convert materials in themselves useless into useful materials? Microbes were clever chemists. Yeast had been put to a useful purpose years ago and now antibiotics were being put to use.

It was possible that our attitude towards micro-organisms had been distorted. We had looked upon them as enemies of human nature but at one time the beasts in the field had been looked upon as enemies. We had domesticated them and made them serve us. We had found that they could be bred for certain characteristics. Would it not pay us to look into the microbiological jungle to see if we could not use some of its inmates? They were ideal slaves, they had no religion, no politics and they worked all hours. They could be put to work on 24-hour shifts.

Concluding, Sir Ben said that he was glad to say that Monsanto Chemicals, in collaboration with the Chemical Research Laboratory of the DSIR and eminent university authorities, were, to a considerable extent, turning their attention from the bacterial destruction of organic matter to prevent river pollution to the bacterial production of useful chemicals not only from the effluents but from some of the main products from which the effluents were derived. This was the real scientific attitude so urgently required in the making of policy for the industry today and his great pleasure at being present was derived as much from this notable present achievement as to the promise for the future.

Following the luncheon Mr. Patterson, General Manager of Production, explained the working of the plant on a scale model which had been erected in the dining hall. The party then split up into small groups with expert guides and were taken around the plant.

The plant, which was carefully inspected by the visitors, originally consisted of two primary settling tanks for strong liquor (each of 125,000 gallons capacity); an automatic lime-slurry feeder for neutralising acid liquors; a dilution and mixing chamber; a

secondary settler; two 100 ft. diameter 9½ ft. deep percolating filters with ancillary equipment for providing 100 per cent recirculation of filter effluent and sand filters for sludge drying.

Construction of the initial plant was substantially completed in August, 1948, and the activation of the new biological beds was commenced at once. The process took over nine months to complete, whereas new beds recently built have been activated in a few weeks. This is attributed to the fact that the area of the treatment plant is now well infected with suitable bacteria, and also to improvements in technique.

By early 1950 operating experience had established that the method of biological purification was a practical proposition and it was decided to go ahead immediately with extensions.

A design project was prepared, incorporating additional filters, greatly increased purifying capacity enabling large scale re-circulation of filter effluent for dilution purposes, and clarification equipment to remove humus from the treated liquor.

Stage 1 of this programme provided for two new filters each approximately equivalent in capacity to one of the original pair. In addition provision was made for a 150,000 gallon clarifier for filter effluent, four new sand filters for sludge drying, and a new feed distribution system at a higher level than the old one. Facilities were also provided for the reception by gravity of a supply of settled sewage from the local sewage works, to assist in the maintenance of a high level of activity in the filters, by the provision of nutrient matter and perhaps of active organisms.

In the second stage of construction two new filters—the fifth and the sixth—were completed in the first half of 1952. The recirculation pump-house and the new combined control-house and laboratory building are nearing completion, as is the new 300,000 gallon clarifier which will augment the existing 150,000 gallon unit in the preclarification of filter effluent.

Drainage Reconstructed

Concurrently with the construction of the plant a very considerable programme of civil engineering work was undertaken in the factory area so as to ensure that all surface water is diverted into the purification plant before reaching the river.

Textile Overproduction

Synthetic Fibres Reach Record Figure

PRODUCTION of synthetic textile fibres throughout the world in 1951 reached a new record of 4,218,000,000 lb., an increase of 15 per cent over the 1950 output of 3,664,000,000 lb., according to the Textile Economics Bureau, of New York.

Production exceeded consumption throughout the world, however. The slowdown in consumption began generally in the second half of 1951 and has continued into 1952 in most countries.

Potential Growing

Total world production last year was made up of 3,358,000,000 lb. of rayon, 599,000,000 lb. of acetate and 261,000,000 lb. of the non-cellulose man-made fibres. The potential capacity of the world's chemical fibre industry is now estimated at 5,174,000,000 lb., of which 4,020,000,000 lb. is in rayon, 755,000,000 lb. in acetate and 399,000,000 lb. in non-cellulose fibres. By the end of 1953, however, the capacity figure is expected to reach 6,057,000,000 lb., or an increase of 17 per cent over the present potential.

Last year's German production totalled 560,500,000 lb., of which 409,500,000 lb. was produced in Western Germany and the remainder in the Eastern zone. Her current capacity is estimated at 660,000,000 lb. and by 1953 should reach 685,000,000 lb. Both these figures exceed the actual pre-war output.

Japan was the second largest producer in 1939, but her output declined steadily to a low point of 27,520,000 lb. in 1945. Since then, however, her production has risen so rapidly that it reached 368,700,000 lb. last year. Japan's current capacity is 436,150,000 lb., and is expected to rise to 561,250,000 lb. by the end of 1953.

Italy, which produced 304,885,000 lb. of rayon and acetate fibre in 1939 and then dropped to 7,345,000 lb. by 1945, had come back to the production of 287,720,000 lb. in 1951. Italian capacity by the end of 1953 will, it is estimated, be 445,500,000 lb.

U.S. rayon and acetate production has increased steadily since 1939, when it totalled 379,940,000 lb., to 1951, when it reached 1,294,150,000 lb. Current U.S. capacity is estimated at 1,480,000,000 lb. and by the end of 1953 it will be 1,714,000,000 lb.—B.U.P.

Iodine Compounds

Check-List to Alternative Names

NEED for information regarding the names, origins, formulae, definitions, synonyms and sources of supply of various iodine compounds, mixtures and preparations becomes increasingly apparent with the new and improved forms which scientific discovery is continually adding to this or that family of drugs.

Every year the Chilean Iodine Education Bureau (London) deals with many hundreds of inquiries from pharmacists, doctors and chemical manufacturers for particulars which are not always readily accessible in standard works. To fill this want, the Bureau has now compiled a guide 'Iodine Pharmaceuticals—A Checklist of Iodine Compounds and Preparations.'

Task Not Easy

Such a task can have been no easy one for the naming and registration of a novel therapeutic substance does not end with the assignment of a single and universally accepted label.

Introduced to science under its true chemical title—often a cumbersome polysyllabic word—the new substance sooner or later appears under a variety of simpler brand names chosen by individual manufacturers concerned with marketing the product to the medical profession. A single product may have as many proprietary names as makers. If, on its therapeutic merits, the substance is eventually accorded a place in the *Pharmacopœia*, it is given an official pharmacopœial name, sometimes more than one.

Basically, the iodine compounds and preparations used in medicine and pharmacy fall into a comparatively few well-defined groups. Within these groups taken together, there are in fact only a few hundred preparations which differ from each other sufficiently in form and type to deserve individual distinction by definite and exclusive names.

With the inclusion of pharmacopœial synonyms and alternative designations applied by manufacturing houses, however, the name-list compiled by the Bureau extends to over 1,400 entries. A single example taken from among the iodine-containing contrast media illustrates this point. Disodium tetraiodophenolphthalein has 21 pharmacopœial and proprietary names.

Entries in the book are arranged alphabetically, each being followed by a short descriptive note. Makers' names are not given, but may be obtained on request from the Bureau. The compilation is confined mainly to preparations of the English-speaking countries, only a few of the better-known products of France, Germany, India and South America being mentioned.

In the preface it is stated that as the word 'checklist' in the subtitle implies, the book is published with the object of gaining further information. It should, in fact, be regarded as a preliminary roll-call of iodine pharmaceuticals carrying an invitation to readers to assist in its revision. Comments, suggestions and observations regarding useful products which may have been overlooked, and about out-moded products, are therefore welcome.

With this assistance the Bureau hopes to undertake a larger work in which iodine pharmaceuticals will be classified not only by alphabet but according to the particular therapeutic purpose for which they are intended, and in which opportunity will be taken to give a comprehensive review of the pharmacological action of iodine in the different spheres of treatment in which it finds application.

Glass as a Lubricant

VANADIUM Corporation of America reports that glass is an efficient lubricant in the commercial hot extrusion of steels and high temperature alloys by the Ugine-Séjournet process. This opens up a wide field of research on the lubricating properties of glass and glass-like products under high pressures and temperatures. The extrusion of steel lends itself to the production of complex forms not amenable to shaping on roller mills or by other methods. Most lubricants hitherto tried have failed. It has now been found that glass introduced in solid form serves both as a lubricant and an insulator, thereby protecting the tools from contact with the billet and with the section during extrusion. The original glass plate used against die and the glass 'test-tube' around mandrel have been replaced by fibrous or woven glass of the simplest form.

MIDLANDS SOCIETY FOR ANALYTICAL CHEMISTRY

The Analytical Chemistry of Magnesium

The final meeting of the 1951-52 *session of the Midlands Society for Analytical Chemistry consisted of a symposium on the alkaline earths and was introduced by two Society members from the Nelson Research Laboratories of the English Electric Co., Stafford.*

The second of these speakers was Mr. A. J. Carwardine who discussed 'The Analytical Chemistry of Magnesium'. A report of his paper follows:—

THE separation of magnesium presents no difficulty in ordinary analysis except when arsenates and phosphates are present in excess, when the magnesium precipitates along with iron and aluminium. The classical methods for the removal of other elements are:—

(a) *Precipitation with hydrogen sulphide in acid solution.* Cu, Ag, Hg, Pb, Bi, Cd, Ru, Rh, Pd, Os, As, Au, Pt, Sn, Sb, Ce, Se, Te, Mo, Th, In, Ca, V, W.

(b) *Precipitation with aqueous ammonia.* Al, Fe^{3+}, Cr, Th, Ca, In, Rare Earths, U, Ti, Zr, Be, Cb, Ta. Also phosphate, arsenate, and vanadate (incomplete).

(c) *Precipitation with ammonium sulphide.* Fe, Zn, Mn, Ni, Co, V, In, Th.

(d) *Precipitation with ammonium oxalate.* Ca, Sr (Ba).

Shredov (1948) reports that the oxalate precipitate always contains magnesium, even after reprecipitation.

Addition of CaO

If small amounts of magnesium are to be determined in the presence of large amounts of calcium, the magnesium can be precipitated by adding CaO to the neutral solution, boiling, filtering, dissolving the residue in HCl, and then carrying out a double oxalate precipitation. If a small amount of calcium is present with large quantities of magnesium, the calcium and magnesium are precipitated as phosphate, the precipitate dissolved in sulphuric acid, and calcium sulphate precipitated by the addition of a large excess of 75 per cent alcohol.

Using the mercury cathode, Cr, Fe, Co, Ni, Cu, Zn, Cd, Ag, Sn, Bi, can be quantitatively separated from Al, Mg, Be, Ti, Zr, and V. Chirnside, Dauncey and Priffitt (1940) described a method for the separation of magnesium in nickel-magnesium alloys, in which the alloy (0.3 per cent Mg) was dissolved in nitric acid, fumed with sulphuric acid, the solution diluted, neutralised, made just acid with sulphuric acid and electrolysed at 90°C with a current of 8 amps. Magnesium was determined in the solution after electrolysis by precipitation as magnesium ammonium phosphate.

Oxine Separation

Magnesium is precipitated as the oxinate at a *p*H of 9.4-12.7 and separations can be made from those metals which are precipitated by oxine in acid solution. Small amounts of Al, Fe, Cu, etc., can be separated from magnesium by precipitating them in acetate buffer solution.

Sideris (1940) separates Al, Fe, Mn, Pb, and Zn from Mg by precipitation in ammoniacal solution with oxine followed by extraction with chloroform, in which only the magnesium oxinate is insoluble.

Acetylacetone forms complexes with Mn, Fe, Cu, Al, Ti, V and U, which are insoluble in water, but soluble in organic solvents. This forms the basis of a method by Abrahamozik (1947) for the separation of these metals from magnesium in the Titan Yellow determination.

Usatenko and Datsenko (1948) used the cationic exchange resin Wofatit R to separate magnesium and calcium from iron and aluminium in the analysis of iron ores. A solution of the ore, containing about 8 per cent tartaric acid, was passed through a Wofatit R filter, the magnesium and calcium being adsorbed and the iron and aluminium passing through. After washing, the magnesium and calcium were extracted from the filter by washing with four portions of 20 per cent HCl, followed by water.

Magnesium in Aluminium Alloys

Many methods have been published for the determination of magnesium in aluminium alloys. Only the more important will be mentioned.

In the 1952 British Standards method low-silicon samples are attacked with sodium hydroxide solution, the insoluble residue

containing the magnesium then being dissolved in aqua regia and fumed with sulphuric and hydrofluoric acids to remove silica. Most other interfering elements are then removed by electrolysis at a mercury cathode, and manganese, titanium and aluminium are finally removed by double precipitation with aqueous ammonia and ammonium persulphate. A double precipitation of magnesium ammonium phosphate is then carried out, and the precipitate ignited to pyrophosphate, corrections being made for traces of calcium and manganese. If the alloy contains more than 2 per cent, the above procedure must be modified, the sample being taken up in hydrochloric acid, and the magnesium remaining in the residue recovered by treatment with sulphuric, nitric and hydrofluoric acids and added to the main filtrate. The bulk of the aluminium is then removed by alkali cyanide separation. This method is time-consuming and should only be used for referee purposes.

Three Methods Published

The British Aluminium Company (1951) has published three methods, in all of which the alloy is attacked with sodium hydroxide:—

(*a*) Classical procedures for separation and determination, the final weighing form being the pyrophosphate. This procedure is very lengthy.

(*b*) A method wherein the magnesium is separated from other elements by double precipitation with oxine from alkaline tartrate solution containing cyanide, followed by precipitation with oxine from ammoniacal solution. This is also a lengthy procedure.

(*c*) A rapid method—modification of method (*b*)—in which interfering elements are removed by precipitation with oxine-acetate buffer solution, magnesium being precipitated with the same reagent in sodium hydroxide solution containing sodium tartrate. The determination is finished titrimetrically.

Stross (1942) attacks the alloy with sodium hydroxide, removes the residue by centrifuging, and dissolves it in sulphuric acid. Interfering metals are precipitated by alkaline sulphide and filtered off, and the determination is finished colorimetrically with Titan Yellow, using starch as protective colloid. In routine analysis, 18 samples were completed in one hour twenty minutes (excluding weighing).

Deterding and Taylor (1946) have proposed a method for the determination of magnesium in aluminium alloys in which the magnesium is precipitated as hydroxide from a solution of the alloy in which all other metals are complexed. The hydroxide is then purified and the determination finished either optically, titrimetrically or gravimetrically.

Excellent results were claimed on alloys containing from 0.1 to 1.5 per cent Mg. It should be noted that aluminium alloys usually contain varying amounts of Cu, Fe, Zn, Si, Mn, Cr, Ni, Ti, Ca, Pb, Sn, and Bi, in addition to Mg.

Extensive research has been carried out by Westwood and Presser (1951) on the determination of magnesium in cast iron. They showed by spectrographic examination that if the classical methods for the separation of interfering elements were carried out, some loss of magnesium invariably occurred due to co-precipitation. By the same methods they showed that other elements, particularly manganese, were always present in the final precipitate of pyrophosphate.

They therefore proposed a method in which the bulk of the iron is removed by extraction with *iso*propyl ether in 8N hydrochloric acid, *iso*propyl ether being used in preference to ethyl ether, as a wider range of acid concentration could be used, and a more complete separation of iron could be obtained with a single extraction. Silicon was removed by baking with hydrochloric acid, otherwise a gelatinous precipitate formed in the ether, and magnesium was lost by occlusion.

Removed by Electrolysis

Most of the other interfering metals were then removed by electrolysis in citric acid solution with a sodium amalgam cathode, this completely removing manganese as well as iron, nickel, chromium, cobalt, copper, tin and molybdenum. It was found that whatever the *p*H of the solution after acidification, it always adjusted itself to *p*H 4-5 within 15 minutes of the start of electrolysis, and that under these conditions, calcium was also separated from magnesium by removal into the amalgam layer. This may possibly provide a new method for the separation of calcium and magnesium without precipitation.

After the above separation had been carried out, the magnesium was determined by

double precipitation as the phosphate; small amounts of interfering elements left in solution after the ether and electrolysis separations were complexed by the citric acid, and did not interfere. The presence of citric acid made it necessary to stir the solution vigorously during the phosphate precipitation—otherwise incomplete precipitation occurred.

Zirconium interfered by co-precipitating with the magnesium.

Precipitation as magnesium ammonium phosphate is the method used most extensively for the determination of magnesium in macro-quantities. Group I, II, IV and V metals must be absent, also phosphates, otherwise magnesium will precipitate with iron and aluminium. Large quantities of ammonium chloride are undesirable. The final weighing form is the pyrophosphate.

If a titrimetric finish is preferred, the magnesium ammonium phosphate is dried to remove excess ammonia, dissolved in 0.1N sulphuric acid, and the excess acid back-titrated with 0.1N sodium hydroxide. The determination can also be completed colorimetrically by dissolving the phosphate in acid and determining the phosphate in solution by the molybdenum blue method.

Reznik and Fedorova (1948) determine magnesium in dolomite by titration with standard disodium hydrogen phosphate solution, the end point being obtained by a photo-turbidimetric method. They state that results agree with those obtained by the pyrophosphate method to within 0.2 per cent of the sample weight.

Precipitation with Oxine

Al, Cb, Co, Hg, Fe, Mn, Ni, Pb, Sb, Ta, Ti, U, Zn, V, Zr, Ba, Be, Ca, Sn, and Sr must be absent for the precipitation with oxine method.

The determination can be completed in a variety of ways, the simplest being to wash and dry the precipitate, and weigh it as $Mg(C_9H_6NO)_2$. There are a number of titrimetric finishes available, the one most widely used being the bromometric titration, in which the oxine precipitate is dissolved in dilute hydrochloric acid, an excess of potassium bromide added and the solution titrated with standard potassium bromate solution until a yellow colour is obtained with methyl red. Some of the newer reversible indicators, for example, α-naphthaflavone are more satisfactory than methyl red in this titration.

Nielson (1939) stated that in the above bromination procedure there is a danger that some bromine will be lost, so that high results will be obtained. In view of this, the oxine is sometimes determined by oxidation with ammonium hexanitrato cerate. The magnesium oxinate precipitate is dissolved in perchloric acid, heated with a known quantity of cerate solution and the excess cerate titrated with ferrous ammonium sulphate solution using *o*-phenanthroline-ferrous complex as indicator. One advantage of this method over the bromination procedure is that the factor is large, one mole of magnesium requiring 59.7 equivalents of cerate compared with a factor of 8 in the bromination procedure.

Colorimetric Determination

Several procedures have been described for the colorimetric determination of the magnesium oxinate precipitate.

In the method due to Hoffman (1937), the magnesium oxinate is dissolved in a hydrochloric acid, ferric chloride solution added, and the solution diluted to a standard volume, the light absorption then being measured at 6,500 Å (orange filter). The relationship between magnesium concentration and colour intensity is linear, or nearly so.

Alten, Weiland and Loofman (1933) dissolve the magnesium oxinate in a mixture of dilute hydrochloric acid and alcohol, add an acetic acid solution of sulphanilic acid and sodium nitrite, and allow the solution to stand for ten minutes. It is then made alkaline with sodium hydroxide and the yellow-red solution compared with a standard.

Traces of magnesium can be determined by precipitation of the oxine complex, the oxine present in it then being determined polarographically. Caruthers (1943) dissolves the oxine complex in hydrochloric acid and constructs the polarogram in a phosphate buffer solution containing gelatine. Stone and Furman (1944), however, add the magnesium solution to a known volume of standard oxine solution, and then use the polarograph to determine the excess oxine in solution, using an ammonium hydroxide-ammonium chloride buffer. The magnesium oxinate does not interfere and so need not be filtered off. The wave used had a half-wave potential of −1.39 volts (S.C.E.). Cations which precipitate with

oxine under these conditions will, of course, interfere, but all the common ones (except aluminium, titanium and calcium) are removed by mercury cathode separation. Up to 150 micrograms of aluminium in 25 ml. solution can be kept in solution by addition of ammonium tartrate, but titanium must be removed by precipitation as the hydroxide. Calcium in quantities up to 0.5 mgm. in 25 ml. does not interfere. By this method 5 to 200 micrograms of magnesium can be determined.

Precipitation with 8-Hydroxyquinaldine

8-Hydroxyquinaldine (2-methyl oxine) forms insoluble complexes with many elements, but not with aluminium, probably owing to the small size of the metal ion. Magnesium is precipitated by 8-hydroxyquinaldine at *p*H 9.3 or greater, and the precipitate is washed with hot water, dried at 140°C. and weighed as Mg $(C_{10}H_5OH)_2$.

Phillips and O'Hara (1950) complete the determination titrimetrically by dissolving the magnesium complex in sulphuric acid, taking an aliquot of the solution, and adding an excess of 0.1N potassium permanganate. After allowing the solution to stand for 15 minutes, potassium iodide is added and the liberated iodine titrated with sodium thiosulphate.

Magnesium oxalate is not precipitated from aqueous solution by the addition of excess oxalate ions, but the addition of certain organic solvents to such solutions will cause precipitation. Acetic acid appears to be the best solvent for this purpose, as it is miscible with water and will dissolve ammonium and alkaline salts to a certain extent.

In the method proposed by Elving and Caley (1937), interfering elements are first removed by normal procedures. Excess ammonium salts are then removed by treatment with nitric acid; oxalate ions remaining from the calcium precipitation are removed by treatment with nitric and perchloric acids. Precipitation is then carried out in 85 per cent acetic acid solution by the addition of saturated ammonium oxalate solution, followed by heating on a water bath. The oxalate can then be filtered off, ignited, and weighed as MgO, or preferably dissolved in dilute sulphuric acid and titrated with permanganate in the usual way.

The chief objection to this method is that the precipitate is very fine and bulky, rendering filtration difficult. Gordon and Caley (1948) used the slow hydrolysis of ethyl oxalate in 85 per cent acetic acid at 100°C. for the production of oxalate ions to precipitate the magnesium. Ammonium acetate must be added to the solution to keep the hydrogen ion concentration constant. This procedure produces coarse particles which can be rapidly filtered on a sintered glass crucible, and the usual permanganate titration carried out. Up to 100 mg. of magnesium can be determined in this way.

The great advantage of this method is that alkalis can be determined in the solution after precipitation of the magnesium, although lithium interferes to a slight extent by co-precipitation as the oxalate.

Magnesium can be titrated directly with sodium hydroxide until the magnesium hydroxide is precipitated quantitatively, the end-point being observed either potentiometrically or with normal indicators.

Boule, Casto, and Haney (1944) use a glass electrode to obtain the potentiometric end-point when analysing magnesite and dolomite. The titration is carried out in boiling 50 per cent alcohol solution, using carbonate-free N sodium hydroxide. The excess acid present after solution of the sample is neutralised by the addition of calcium carbonate, this procedure also precipitating weak bases such as titanium, aluminium and ferric iron, and preventing their interference. Manganese in quantities greater than 5 mg. must be oxidised to manganese dioxide with bromine water. Phosphate, perchlorate, nitrate and chromate do not interfere in normal quantities.

Known Excess Added

Williams (1946) adds a known excess of sodium hydroxide solution and titrates the excess alkali with sulphuric acid. The sample is taken up in sulphuric acid, silica and the bulk of the calcium present being removed by fuming to dryness, taking up in hot water and filtering. The filtrate is made neutral with sodium hydroxide and sulphuric acid, and the R_2O_3 group removed by filtration. The standard sodium hydroxide is then added and the suspension made up to volume. After filtration through a dry paper, an aliquot is taken and the excess alkali back-titrated with sulphuric acid. For this method the sodium hydroxide need not be carbonate-free.

Abbey (1951) describes a modification of the above procedure for the determination

of magnesium in calcium metal. The sample is taken up in water and hydrochloric acid, the solution neutralised and calcium precipitated by the addition of sodium sulphate. After standing for ten minutes, excess sodium hydroxide is added and the solution filtered. The excess sodium hydroxide is then titrated with sulphuric acid, using bromocresol green as indicator.

A method has been proposed by Langford (1942) for the determination of magnesium in nickel plating solutions, by titration with 0.2N EDTA using Eriochrome Black T indicator in an ammonia-ammonium chloride buffer. Nickel is complexed with sodium cyanide before titration, and if the cyanide is added before the ammonium hydroxide, iron, etc., is also complexed. Langford states that iron, copper, zinc, cobalt, sodium formate, sodium citrate, etc., do not interfere with this method if they are present in normal working concentrations, but trivalent chromium, aluminium and manganese interfere and must be removed by precipitation.

The results using this method are claimed to be very good for routine analysis of nickel plating solutions containing from 10 to 150 g.p.l. of $MgSO_4.7H_2O$. Lower concentrations require more dilute EDTA solutions and accuracy is impaired. Sodium and sulphate ions interfere in determinations of low concentrations of magnesium.

Langford carries out the titration in a bulk of 50 ml. but other workers report that the end-point obtained is very poor. If, however, the same quantities of materials are used, but the solution is diluted to 200 ml., a good end-point is obtained, the colour change being from red to dark green.

Colorimetric Methods

Titan Yellow gives a red colour with an alkaline suspension of magnesium hydroxide and a yellow brown colour in the absence of magnesium. In the method by Gillam (1941), hydroxylamine hydrochloride is added to prevent the colour from fading. The colloidal suspension is stable up to a concentration of 4 parts per million and so a protective colloid is not necessary in this range.

Certain other metal hydroxides (e.g., cadmium) also adsorb Titan Yellow with a resultant change in colour and must be removed. Metals whose hydroxides are soluble in sodium hydroxide solution, particularly aluminium and tin, must also be removed, as they reduce the intensity of the magnesium colour. This is probably due to adsorption of the aluminate or stannate on the magnesium hydroxide precipitate, with a consequent decrease in the adsorption of the dye. Even 4 p.p.m. of aluminium will interfere. In Gillam's method, NH_4+ can be present up to 500 p.p.m., $PO_4 \equiv$ up to 100 p.p.m., and $Ca++$ up to 100 p.p.m. Calcium intensifies the colour given by magnesium, but this is prevented by complexing the calcium with sucrose.

Similar Dyes Used

Several other dyes similar to Titan Yellow have been used in the colorimetric determination of magnesium. Taras (1948) uses Brilliant Yellow, which some workers claim is Titan Yellow, in water analysis, since aluminium in concentration up to 10 p.p.m. increases the magnesium colour. Above this range of aluminium, the colour is decreased as in the Titan Yellow determination. As the colour intensification remains constant for a range of 1 to 10 p.p.m. aluminium, the concentration of the solution is brought within this range by the addition of a compensating solution.

In the determination of magnesium in soils, blood and plant tissue, Hunter (1950) adds a known excess of standard Thiazole Yellow solution to the magnesium solution, and makes alkaline with sodium hydroxide. The solution is allowed to stand for several hours and the excess dye extracted with a mixture of *n*-butyl alcohol and ethyl alcohol. The absorption of this solution is then measured on the Spekker, using violet filters.

Bacon (1951) uses Solochrome Cyanine R.S. for the determination of magnesium in aluminium alloys. Over a limited range of magnesium concentration the solution need not be completely free from aluminium.

Thiel and van Hengel (1938) use quinalizarin, which gives a blue lake with magnesium hydroxide in sodium hydroxide solution and a violet colour in the absence of magnesium. Separation from most other elements is necessary including beryllium, rare earths, zirconium and thorium, which all give blue colours in strongly basic solutions of quinalizarin. The light absorption is measured at 6,000 Å as soon as possible after the formation of the lake, since, although the lake

itself is stable, the excess quinalizarin in the basic solution is not.

Venturello and Sainsi (1947) use diphenylcarbazone, which gives a red colour in potassium hydroxide solution.

A gastrometric method is useful for the determination of free magnesium in magnesium metal when oxides are present. The metal sample is dissolved in hydrochloric acid and the volume of hydrogen evolved measured in a gas burette. Corrections must be made for any other metals such as iron, aluminium, etc., present as these also evolve hydrogen when attacked by acid.

When this method was used during work on the Manhattan Project ferrous sulphate and platinum metal were added during evolution to increase the catalytic activity and also to prevent particles of metal from floating on top of the solution.

Szamek (1939) proposed a method for the direct titration of magnesium in which magnesium hydroxide is precipitated with barium hydroxide, the excess barium hydroxide then being precipitated by the addition of zinc sulphate solution. The excess zinc sulphate solution is then back-titrated with standard barium hydroxide solution, using thymolphthalein as indicator. Elements of the first three analytical groups must be absent and calcium can only be present in low concentrations, otherwise it will be precipitated with the magnesium.

Carboys & Carboy Hampers

IN 1936 when the first British Standard was issued for glass carboys, the balloon-shaped container was the only one in general use. In recent years, a straight-sided carboy has become popular in the 5-gallon size.

A revision of this standard has therefore been undertaken (B.S. 678:1952—'Carboys and carboy hampers') which provides for a 10-gallon balloon carboy and a 5-gallon straight-sided carboy.

A great deal of development is at present taking place in the design of carboy hampers and consequently these are not specified in detail. The new standard, however, includes a very informative illustrated appendix on carboy hampers. A valuable addition to the new standard is an appendix giving notes on safety precautions to be taken with carboys.

Copies of this standard may be obtained from the British Standards Institution, 24 Victoria Street, London, S.W.1, price 3s. 6d.

Tin as a Protection from Rusting

SINCE more than half the usage of tin is in coatings for the protection of steel and other metals from rusting and corrosion, the Tin Research Institute has now published a book* on this subject by Mr. S. C. Britton, M.A., who is responsible for its research work on corrosion.

This book is in three parts. The first deals with the corrosion of tin itself, the second with its alloys, and the last with coatings of tin and its alloys upon other metals.

After a section on atmospheric corrosion, both indoors and outdoors, there are sections on corrosion by acids and by alkalis in both of which the influence of atmospheric oxygen is often decisive. Milk products, an important class of materials which are mainly treated and transported in tinned equipment and vessels, are separately discussed.

Alloys of tin are discussed in Part II, the alloys dealt with principally are solders, bearing metals and bronzes.

Tin coatings and tin-alloy coatings are the subject of Part III (31 pages). There is a brief account of the various methods by which the coatings can be produced. Experiences with canned foods figure largely in the discussion of tinned steel containers for acid products and the effects of oxygen and of inhibitors are reviewed.

The work concludes with a review of the properties of the following tin-alloy coatings which have found increasing applications in recent years: tin-lead, tin-zinc, tin-cadmium, tin-copper (speculum especially) and the new tin-nickel electroplate which has outstanding qualities of corrosion and tarnish resistance.

* 'The Corrosion Resistance of Tin and Tin Alloys,' by S. C. Britten, M.A., head of the Corrosion Department, the Tin Research Institute, Greenford, Middlesex. 77 pp., price 3s. 6d. (U.S.A. 50 cents.)

West Country Branch

In accordance with their policy of full local technical service to industry (a branch office was opened in Birmingham last March), Messrs. Acheson Colloids Ltd., manufacturers of the well-known 'dag' colloidal graphite and other dispersions, have just opened a West-of-England office at 103 Promenade, Cheltenham. Telephone: Cheltenham 3847.

Cast Iron Research Laboratories

Open Day at Bordesley Hall

ON 2 and 3 July, the British Cast Iron Research Association held two Open Days for members of the Press and representatives of member-firms to see their new laboratories at Bordesley Hall, 12 miles outside Birmingham. After arriving at the Hall at 2.30, visitors were taken on a brief tour of inspection of some of the laboratories, all of which were not yet completed.

Research investigations at present in operation cover nodular graphite formation in the as-cast condition with special reference to interfering elements; the effect of gases on the properties of cast iron; direct reading methods for cast iron analysis and the determination of trace elements in cast iron; the causes of enamelling defects; the properties of sand at high temperatures, with special reference to scabbing defects and the influence of synthetic resins in core-making by the shell moulding technique; the influence of notching, under-stressing and over-stressing on the fatigue properties of various cast irons; the nature of impact failure and the qualities which impart shock resistance, as well as methods for the testing of impact strength; factors governing the soundness of iron castings; the corrosion of cast iron ships' propellers and buried pipes; and factors influencing chill depth and type of mottle.

The Chemical Research Section is developing new methods of analysis of ferrous and foundry materials, and improving old ones. Methods have recently been developed for the determination of very small amounts of lead, antimony and bismuth, which are of importance in nodular iron. This section possesses a Uvispek and spectro-photometer and other analytical apparatus.

Microscopic Examination

One laboratory is concerned with the preparation of microspecimens, the microscopic examination of metal structures and their photographic recording. Microscopic examination forms one of the most important means for providing information on ferrous materials, although the interpretation of the visual results requires much skill and experience, as indeed does the polishing and preliminary preparation of the specimens.

The laboratory equipment includes bench and projection miscroscopes by Cooke Troughton & Simms; three Jackson polishing machines; a hydraulic press for mounting microspecimens, a Kodak 18-in. print glazing machine and equipment for the dry mounting of photographs. The Vickers projection microscope can be used for vertical illumination, dark-field illumination, and examination of structures under polarised light and macro-examination, and is equipped with a wide range of objectives including a mono-bromo-naphthalene immersion objective used for high resolution in conjunction with the mercury arc.

Photographic Equipment

Photographic equipment includes 5-in. by 4-in. and 35 mm. cameras with normal lighting equipment and flash gun attachments. Dark rooms (37-38) for the preparation of plates and printing adjoin this laboratory and, in addition to the usual equipment, contain a Ruthestat document copying machine and Kodak half-plate commercial and Ilford 35 mm. enlargers. An apparatus for making copies of graphs and line drawings, which may be rapidly reproduced on a duplicating machine, is also in use.

The production of gamma-radiographs is carried out in a small hut isolated from the main buildings, so that long exposures can be carried out in safety. The apparatus consists of an adjustable rig devised by the Association, and a lead 'bomb' containing the source. Two sources are used, cobalt^{60} and iridium^{192}, both obtained from the AERE at Harwell.

An interesting laboratory is the new spectrographic laboratory. The old one contains a conventional quartz prism spectrograph, microphotometer and comparator, but the new one houses a quantometer and will eventually contain all spectrographic apparatus belonging to the old laboratory as well. The temperature here is controlled to ± 2°F. and attempts have been made to reduce the incidence of dust. The quantometer itself consists of a high precision source unit which can reproduce almost any known type of electrical discharge; a spectrometer which measures spectra by means of photo-electric cells, and a recording console which

records through an electronic system the photocell currents produced in the spectrometer.

The instrument was applied for at a time when the United Kingdom was receiving Marshall Aid, and negotiations had reached an advanced stage when this was suspended. However, the Department of Scientific and Industrial Research then generously offered a special grant of 80 per cent of the first cost and the arrangements to purchase were completed. Delivery has been effected, although the makers' engineer has yet to attend and demonstrate the operation of the equipment as part of the contract. Although the instrument forms a complex electronic and photo-electric system, it will be comparatively simple to operate and it is anticipated that the ordinary elements in a cast iron usually determined spectrographically will be recorded within sixty seconds of the sparking of the sample. It will be the only instrument of its kind in the iron-founding industry, although there are three or four others in the country which will be available mainly to the non-ferrous industry.

Widespread Possibilities

While the above figures of analysis refer to elements in ordinary cast iron which can normally be determined spectrographically, some twelve elements can be dealt with in all, and it is hoped to be able to carry out determinations of carbon and phosphorus, elements which are not normally capable of being determined by spectrographic means. A convincing demonstration of the apparatus was given before visitors.

One of the most important of the Association's activities is the operational research team. This was inaugurated in June, 1950, with the object of helping member-firms increase efficiency in production. The response of the industry has been very good, and in the two years the team has been operating it has made 213 visits to foundries at managements' request. Originally the team consisted of three members, but it has recently been augmented by two more, thus enabling two teams to operate at once. A visit from the team usually lasts one or two days, after which it writes a confidential report and sends it to the management. Problems which require closer study of technical details are passed on to the Development Department. The team itself usually deals with problems of quality, output, cost and the economical use of manpower. A map was exhibited on the wall of the team's office, showing past visits and those scheduled to be carried out in the future. Judging from the latter, the team is booked up for some weeks to come.

The work of the development department covers visits to problems in foundries—duration of stay now being up to a week—as well as the working out of problems in the Department's laboratories. These latter investigations have dealt with the magnetic properties of cast iron, the strength of welds in cast iron and the production of carbon monoxide from moulds, mould-driers and cupolas.

The branch of the Development Department concerned with foundry atmospheres was formed in 1951 because of the increasing recognition of the need for experimental work in improving conditions of dust, fume and heat in iron foundries. One particularly valuable piece of work in this respect has been on the removal of the fine dust entrained in the air stream on the periphery of the wheel on stand grinders. Conventional hood extractors are entirely inadequate for removing this, and the repositioning of exhaust ducts has led to vastly improved conditions for the operator. A demonstration of old and new types was given, with smoke, and the difference was striking. Exhaust ducts now consist of two fantail ducts above the wheel and two vertically slotted cylinders either side of it. Examination of an actual dust stream is made by using bright lights. One point about the new scheme is that power consumption is expected to be less than with the old one.

Refractory Laboratory

Particularly interesting in the sand and refractory laboratory was work being done on the new process of 'shell-moulding' where a mixture of resin and sand or other filler is used as a mould instead of sand alone. Examples were shown of moulds in phenol-formaldehyde and urea-formaldehyde, and the products obtained from them. One particular cast specimen was said to have saved three separate machining operations by its precision. Screw threads can be cast by the shell-moulding technique. (For further details of this process, *see* THE CHEMICAL AGE, **66**, 894).

Other exhibits on show in this laboratory dealt with the stress-strain characteristics of

moulding sand at room and elevated temperatures, the expansion of moulding sands —an important factor in determining whether a sand will 'scab' or not in practice, and the 'flowability' and specific surface of sand samples.

The gases laboratory was mainly concerned with the determination of oxygen, hydrogen and nitrogen in cast iron by means of vacuum fusion. The apparatus was a high-vacuum system, essentially, containing a graphite crucible assembly heated by a high-frequency generator.

Samples of metal are introduced into the hot crucible and the gases evolved from the molten metal collected and analysed. The high frequency generator is a valve oscillator with an input of 30 kVA. Other equipment is available for the heat treatment of samples in vacuum, a nickel-chromium wound furnace being used for temperatures up to 1,000°C.

Conditions for Unsound Castings

Faults in cast iron were the subject of experiments in the physical metallurgical laboratory. Exhibits showed the results of an investigation to discover the conditions under which unsound castings are produced. Examples of various defects were shown in sawn castings, and gamma-radiographs of the same castings clearly showed these same defects. The particular defects in question were those caused by contraction of the metal with lowering of temperature, and resulted in centre line shrinkage porosity in small flat castings, concave impressions in the lower flat surfaces of light castings, and other failures. Gamma-radiographs were also used to determine the final position, after pouring, of thermocouples inserted in solidifying castings to measure the distribution of temperature throughout the casting during cooling. The effectiveness of atmospheric pressure feeding applied to cast irons had also been under study, and some experimental castings were on view.

The other physical metallurgy laboratory was used for general metallurgy. Apparatus was provided for cooling curve determinations, including platinum-wound furnaces used in conjunction with Kent potentiometric chart recorders. Potentiometric measuring apparatus was also housed in this room. Portable potentiometers by Negretti and Zambra and Leeds Northrup, used in conjunction with immersion thermocouples were shown. Also shown was a Cooke, Troughton and Simms binocular microscope, used for the metallographic examinaton of specimens by the research staff.

An investigation on fluidity had recently been completed in this laboratory, and some of the foundry pattern equipment and results were shown. Causes and mechanism of blistering defects in vitreous enamels applied to cast iron were also being studied, the effects of casting skin on blistering being demonstrated by actual examples.

The Corrosion Testing laboratory deals with corrosion problems brought up by members. Two main lines are being pursued at present—cast ships' propellers and buried pipes. The practical work of the investigation is proceeding along several main lines. These include field work examinaton of propellers, the determination of their mechanical properties in various sections, investigation of structures most likely to resist cavitation erosion—for this purpose a jet impact machine has been constructed—and service trials of various protection schemes and coatings. Field work on buried pipes is being carried out in the Cotswold's.

A mechanical testing laboratory containing the equipment for special tests such as tension tests, low temperature impact tests, etc., and another chemical laboratory for the regular analysis of all types of cast iron and for the determination of alloying constituents completed a most interesting tour of the Research Association's laboratories.

New Rubber Catalyst

RECENT developments in the chemical treatment of ordinary gum turpentine and wood turpentine in the U.S. may replace benzene as a catalyst in the manufacture of synthetic rubber in that country, it is reported. These developments concern terpene hydroperoxides, which a branch of the U.S. Department of Agriculture has found can be produced economically on an experimental scale with similar equipment to that used in the production of oleomargarine and cooking oils from cotton-seed oil.

For example, pinane hydroperoxide, a catalyst particularly suitable for the production of 'cold' rubber, can be produced by catalytic hydrogenation of the pinene from turpentine, and the resultant pinane oxidised by atmospheric or gaseous oxygen.

Research in Industry

Speedy Application Essential

QUICKER application of new ideas and discoveries was the reason for the greater productivity per man-hour enjoyed in America compared with Britain, declared Dr. Alexander J. King, chief intelligence officer of the Department of Scientific and Industrial Research on 30 June, when he addressed the Glasgow Chamber of Commerce on 'Science and the Small Firm.' He said that the difference in productivity was approximately in the ratio of two to one in favour of America.

Dr. King said that he considered that the predominating factor in connection with low productivity was the rate of application of new technology—the speed at which new ideas and discoveries in the laboratory were applied in the factory. In America most firms where production was being undertaken also continually carried out research. This was particularly true of the electrical and chemical industries, and he had been forcibly struck by the extraordinary good results which had been obtained. There was nothing particularly difficult or high-brow about it. It was really good application of the best technology by the operational type of approach.

Mr. H. Yates, president of the Chamber, thanked Dr. King for his address, and said it was to be regretted that although Scotland had produced many first-class scientists she had retained very few of them. We had exported them to England and abroad. It would be a great gain for Scottish industry if more firms, who could afford it, would engage people with proper scientific training and qualifications. The whole subject was vital to industry.

Saccharin Standards

THE Food Standards Committee have reviewed the temporary standard for saccharin tablets contained in the Saccharin Order, 1949, S.I. No. 945, and have recommended that the standard for saccharin tablets shall be maintained and extended to cover 'other sweetening tablets containing saccharin.' They also recommended that the provisions with regard to the packaging and labelling of saccharin tablets should be continued and extended to cover sweetening tablets containing saccharin, but they did not think it necessary in future to apply the description 'standard' to saccharin tablets.

The Committee recommended that the standard for saccharin tablets and for other sweetening tablets containing saccharin shall be as follows:—

A saccharin tablet or other sweetening tablet containing saccharin

(a) shall contain not less than 0.18 grain and not more than 0.22 grain of saccharin, or the equivalent weight of soluble saccharin;

(b) may contain as excipient sodium bicarbonate with or without other suitable substances. The total amount of excipient shall not exceed four times the maximum quantity of saccharin;

(c) shall not contain more than five per cent water-insoluble matter, nor less bicarbonate than that required to render the saccharin completely soluble.

A period of one month will be allowed for representations from any interested parties. Those wishing to make representations should write to the Secretary, Food Standards Committee, Great Westminster House, Horseferry Road, London, S.W.1, not later than 26 July, 1952.

Behenic Acid on Sale

SINCE they came into production in 1950, Hess Products, Ltd., have made a series of highly pure fatty acids on a commercial scale in their fractionating plant at Littleborough as well as offering a wide range of normal grades of stearine and fatty acids.

They now announce a new addition to their range with highly pure behenic acid. This is a saturated fatty acid of C.22 chain length and has the following approximate tests and composition:—

Acid value	160-165
Saponification value	160-165
Iodine value	3 max.
Titre	74-76° C.
Melting point ..	76-78° C. (complete fusion, capillary tube)
Unsaponifiable ..	3% max.
90% ..	Behenic
8% ..	Stearic
2% ..	Unsaponifiable

It will be of interest to any company making waxes, chemical derivatives, metallic soaps, textile compounds, lubricants and any other products where a high melting point or long carbon chain are necessary.

Samples and full particulars can be obtained from Hess Products Sales Office at 4 Albion Street, Leed, 1.

The Analytical Section of the IUPAC

It's History, Organisation, Aims & Activities

AT the close of the September, 1951 meeting of the International Union of Pure and Applied Chemistry in New York, the Analytical Section officially came into being. After a period of some four years of effort, originating at the London meeting in 1947, punctuated by meetings in Amsterdam in 1949 and at Graz in 1950, a provisional Section Committee formed at Amsterdam worked with the Paris headquarters of the Union, and formulated Rules for the Section. These were submitted to members and adopted at New York. The Analytical Section meeting in New York was the first official section meeting under IUPAC auspices.

The Section is composed of a Section Committee, a group of commissions working on problems of general interest to analytical chemists and subcommisions. The officers elected at the meeting in New York are: president C. J. van Nieuwenburg (Delft), 1951-53; vice-president, I. M. Kolthoff (Minneapolis), 1951-53; vice-president, P. E. Wenger (Geneva), 1951-55; and secretary, S. E. Q. Ashley (Pittsfield), 1951-55. They constitute the Executive Committee. The Section Committee is responsible for the general conduct of Section activities and consists of: The president, secretary and treasurer of the Union; F. E. Beamish (Toronto), 1951-53; G. Charlot (Paris), 1951-53; R. C. Chirnside (London), 1951-55; F. Feigl (Rio de Janeiro), 1951-55; J. Gillis (Ghent), 1951-53; and J. I. Hoffman (Washington), 1951-55.

Section Commissions

The Commissions which at present are carrying on the work of the Section are as follows:—

Commission on Analytical Reactions:—R. Belcher (Birmingham), F. Burriel-Marti (Madrid), N. D. Cheronis (Brooklyn), C. Duval—secretary—(Paris), J. Gillis—chairman—(Ghent), A. Okác (Brno), P. Rây (Calcutta), M. Servigne (Paris), P. W. West (Baton Rouge), and J. H. Yoe (Charlottesville).

Commission on Microtechniques: E. Abrahamczik (Ludwigshafen-am-Rhein), A. A. Benedetti-Pichler (Flushing), P. L. Kirk—vice-chairman—(Berkeley), H. Lieb (Graz), H. Malissa—secretary—(Graz), P. E. Wenger (Geneva), C. L. Wilson (Belfast), and M. K. Zacherl—chairman—(Vienna).

Commission on Physico-Chemical Data of Analytical Interest: R. G. Bates (Washington), W. R. Brode (Washington), G. Charlot (Paris), G. Duyckaerts (Liège), I. M. Kolthoff—chairman—(Minneapolis), H. A. Laitinen—secretary—(Urbana), G. Schwarzenbach (Zürich), and L. G. Sillén (Stockholm).

Commission on Terminology and Expression of Analytical Results: D. H. Dodd (Thorncliffe, near Sheffield), R. J. Forbes—chairman/secretary — (Amsterdam), R. Gauguin (Paris), F. D. Tuemmler (Emeryville), and G. T. Wernimont (New York).

List of Publications

The Commission on Analytical Reactions has been in existence since 1934 and has issued the following publications:—

Tables of Reagents for Inorganic Analysis; First Reports of the 'International Committee on new Analytical Reactions and Reagents' of the 'Union Internationale de Chimie' (Leipzig, Akademische Verlagsgesellschaft M.B.H., 1938); Réactifs pour l'Analyse Qualitative Minérale recommandés par la Commission Internationale des Réactions et Réactifs analytiques nouveaux de l'Union Internationale de Chimie. Deuxième Rapport (Rédacteur: P. E. Wenger et R. Duckert Bâle, Wepf et Cie, 1945); Reagents for Qualitative Inorganic Analysis; Second Report of the 'International Committee on New Analytical Reactions and Reagents' of the International Union of Chemistry—P. E. Wenger and R. Duckert, editors (New York, London, Amsterdam, Brussels: Elsevier Publishing Co., Inc., 1948); Tables of Reagents for Inorganic Analysis—Third Report of the 'International Committee on New Analytical Reactions and Reagents' of the 'Union Internationale de Chimie,' Cl. Duval, editor (Paris, Libraire Istra, 1948); Réactifs pour l'Analyse Qualitative Minérale—Recommandés par la Commission Internationale des Réactions et Réactifs analytiques nouveaux de l'Union Internationale de Chimie pure et appliquée. (1937-1947), P. E. Wenger and Y. Rusconi, editors

(Paris, Société d'Edition d'Enseignement Supérieur, 1950).

The Commission on Microtechniques was formally established at the meeting in Graz. It has begun to study the better organisation of analytical literature, certain questions of standardisation of microchemical apparatus, and the organisation of international meetings on microchemistry.

Divided into Subcommissions

The Commission on Physico-Chemical Data of Analytical Interest has divided its work among several Subcommissions concerned with the following:—

Subcommission on Polarographic Data: J. Heyrovsky (Prague), H. A. Laitinen—chairman — (Urbana), G. Semerano (Padova), J. K. Taylor (Washington), and S. Wawzonek (Iowa City).

Subcommission on Emission Spectrography: W. R. Brode—chairman—(Washington), J. R. Churchill (New Kensington), A. Gatterer (Castel Gondolfo), J. Gillis (Ghent), and B. F. Scribner (Washington).

Subcommission on Absorption Spectrography: W. R. Brode (Washington), G. Duyckaerts—chairman—(Liège), J. Lecomte (Paris), M. G. Mellon (Lafayette), and A. C. Menzies (London).

Subcommission on Potentiometric Data: R. G. Bates—chairman—(Washington), H. T. S. Britton (Exeter), N. H. Furman (Princeton) and L. G. Sillén (Stockholm).

Subcommission on Oxidation-Reduction Potentials: R. G. Bates (Washington), G. Charlot—chairman—(Paris), H. A. Laitinen (Urbana), M. Pourbaix (Brussels), L. G. Sillén (Stockholm), P. Souchay (Paris) and E. R. Swift (Pasadena).

Subcommission on Stability Constants of Complexes: J. Bjerrum (Copenhagen), D. N. Hume (Cambridge) and G. Schwarzenbach —chairman—(Zürich).

Subcommission on Solubility Data: W. Feitknecht (Bern), I. Leden (Göteborg), A. Ringbom (Ado) and L. G. Sillén—chairman —(Stockholm).

It is the intention of this Commission to sponsor the publication of critically selected values of constants and numerical data of importance to the work of analytical chemists, and to provide analytical chemists with authoritative data and consistent conventions for reporting results.

The Commission on Terminology and Expression of Analytical Results has begun the study of the format of analytical methods, symbols and units for expressing analytical results, the definition of terms relating to sampling, precision and accuracy, quality control, design of experiments and so on. A glossary of terms with equivalents in various languages is also under consideration.

Cooperative efforts will also be undertaken, for instance, in connection with the development of test methods for evaluating chemical reagents, for the proper use of symbols and other terminology, on spectrographic data and so on.

An important function of the Section's activity is the co-ordination of international meetings and congresses on subjects of interest to analytical chemists. Without such co-ordination, there is danger that congresses may overlap in interest, become too frequent, or may not obtain general support. Effective co-ordination can greatly reduce travel for those interested in attending, and can assist in procuring the necessary financial support for an effort of this kind.

The next meeting of the Section, its Section Committee and the Commissions will take place in Oxford, at the time of the Congress on Analytical Chemistry.

No programme has yet been formulated for the publication of Commission findings, although the five books mentioned above have appeared as a result of the work of the members of the Commission on Analytical Reactions.

Suggestions for other fields of activity may be submitted to the Analytical Section by writing to the secretary at 100 Woodlawn Avenue, Pittsfield, Mass., U.S.A.

First Sulphur Plant

At Jumping Pound, bordering the foothills of Alberta, now an outstanding and increasingly important oil-producing region, Canada's first plant producing sulphur from petroleum was recently brought into operation. Ancillary to Shell's natural gas plant and costing nearly $400,000, this new project is designed to recover sulphur at a rate of more than 10,000 tons per annum. Under an arrangement between Shell and the Powell River Company in British Columbia, the latter concern will purchase Jumping Pound's entire sulphur production for distribution to Pacific Coast pulp and paper manufacturers.

The Chemist's Bookshelf

QUANTUM THEORY. By David Bohm. Prentice-Hall, New York; Constable & Co., Ltd., London. 1951. Pp. ix + 646. 45s.

There are many students who, although convinced of the power and essential correctness of the quantum theory, cannot help considering it as a piece of mathematical virtuosity rather obscurely related to the physical world. This attitude, however understandable, is to be regretted. Any serious attempt, therefore, to bridge the gap between the formation of wave and matrix mechanics and conceptual pictures of physical processes should be welcomed. Professor David Bohm, in the present book, sets himself just this task. As he says the central aim of the book is 'to provide . . . . a formulation of the quantum theory at a relatively elementary level . . . in terms of comparatively qualitative and imaginative concepts'. In this he achieves a considerable measure of success so that, although the scope of the book is otherwise fairly conventional, it may be deemed a worthwhile contribution to the already copious literature of the subject.

The first part of the book is devoted to the logical development of quantal ideas since the time of Planck's hypothesis. After an account of the work of Bohr and Sommerfeld the author develops fully the de Broglie theory of matter waves and in this way derives Schrödinger's equation. The fundamental significance of the uncertainty principle is thoroughly demonstrated by its application to a number of important systems. This leads to a lengthy chapter, with some philosophical bias, in which the causal laws of classical physics are analysed and compared with the indeterministic view required by modern theory.

The mathematical formulation of the theory is essentially heuristic, but all the basic material for attacking particular problems is marshalled clearly and with considerable rigour. The treatment of square potentials is carried out in some detail, while the Wentzel-Kramers-Brillouin approximation is used to discuss non-square systems. The problems of the hydrogen atom and the harmonic oscillator are solved exactly.

After dealing with the matrix formulation of quantum theory and applying it to spin and angular momentum, the author takes up a number of more difficult topics. Perturbation theory, usually so formidable to beginners, is developed systematically in three full chapters in which simple adiabatic perturbations, degenerate perturbations and sudden perturbations are dealt with in turn. The Born approximation and the method of Faxen and Holtsmark are treated in a very clear and useful chapter on scattering and the book concludes with an analysis of the measuring process from the quantal viewpoint.

Although the author's avowed purpose is to develop as far as possible the pictorial aspect of the subject, it should not be inferred that the treatment is in any way naïve or superficial. On the contrary, a nice balance is maintained between mathematical exposition on the one hand and a detailed interpretation of the essential physics of the subject on the other. There is little in the book of specific chemical interest; but to anyone who has occasion to use quantum theory and who wishes to sharpen his insight into the subject, to advanced degree students, and to those conducting courses in wave-mechanics, the book can be recommended with confidence.—P. K. CARROLL.

AUTOMATIC AND MANUAL CONTROL. Edited by A. Tustin. Butterworths Scientific Publications. London. 1952. Pp. 584 + XI. 50s.

The Conference on Automatic Control organised by the Department of Scientific and Industrial Research at Cranwell in July, 1951, attracted scientists from many parts of the world. The papers presented at that conference have now been collected into a single volume which the editors hope 'will be useful not only as a work of reference

for those engaged in the design of control equipment, but also as a book to be read by students and others . . . who wish to bring their knowledge up to date or to extend it further in various more specialised directions.'

The papers are arranged in seven main sections dealing with (1) Educational problems, (2) General theory, (3) Process control, (4) Non-linear problems, (5) Systems working on intermittent data and step-by-step servos, (6) The human operator, and (7) Particular applications including analogue computors and other devices. The discussion on each paper is given either directly following the paper or after a group of papers on similar subjects, and is indexed for ease of reference.

The scope of the papers presented is extremely wide, covering almost every field to which feed-back systems can be applied.

For instance, in the section on process control the following topics are discussed : 1. Steady state systems in automatic process control; 2. servo theory in process control; 3. air operated controllers; 4. pneumatic controllers; 5. measuring and transmission lags: 6. recent developments in process control, and 7. transfer function analysis of heat exchange processes.

Each subject is presented at an advanced level and the treatment is essentially mathematical. Two papers are included which deal with, (a) the calculus of finite differences and (b) the theory of the complex variable. These provide sufficient background information and references to enable a reader to follow the general treatment. Thus the book will serve as a text for a course on control systems to both graduate and undergraduate schools of chemical, electrical and mechanical engineering.

In the chemical industry the book is primarily of interest to instrument and design engineers, but will also stimulate many to investigate the application of new systems of control to existing problems.

The book is well produced, in clear and attractive type, well indexed and the editors are to be complimented on producing so complete a record of a large conference in so short a time. Many who were unable to attend the original conference will wish to possess this record of one of the most stimulating scientific discussions in recent times.—F.M.

Sicilian Sulphur Prospecting

PROSPECTING for sulphur in Sicily is a difficult task, not only because local mining concerns have all but exhausted all the rich surface seams, but also because structure formations are geologically very involved. A Sulphur Board has been set up to find the sulphur, and this has enlisted the help of the State Geological Service, which is in possession of maps of the areas. The Board has erected a special building 2½ miles from Caltanissetts, housing a laboratory, offices and 'archives' for samples. There are also several huts for drilling teams, workshops, etc. The counter-flush method of taking samples has been given up by the Board because indications of depth are not accurate enough, and the samples are not thick enough for reliable analysis. A continuous method has been adopted which permits penetration of sterile layers quickly, and sampling at a precise depth. To date, the Board have carried out 44 complete drillings. Of these 23 have met layers of sulphur of sufficient thickness and quality to permit exploitation on an industrial scale, two struck old mines—the existence of which had not been suspected—and 19 met strata either without sulphur at all, or containing only small quantities of it.

Promising New Antibiotic

RESEARCH scientists have discovered a new broad-spectrum antibiotic which does not produce disturbing side-effects, although it appears to be as effective as many of the antibiotics now in use, it was announced in the U.S. on 24 June. Tests indicate that use of the new drug, called 'Ilotycin,' is not accompanied by the allergic manifestations and gastro-intestinal side-effects which often occur with some other antibiotics. The new compound also appears to be effective against many organisms which have become resistant to penicillin or other antibiotics. 'Ilotycin' was discovered in the research laboratories of Eli Lilly and Company, Indianapolis pharmaceutical manufacturer, climaxing a five-year programme of intensive research in this field. Lilly scientists tested organisms isolated from samples of common oil gathered from all over the world, and an organism from soil from the Philippine Islands is the source of the new antibiotic.

Cancer Research Progress

Chemists' Role More Important

THE annual general meeting of the British Empire Cancer Campaign took place in the Moses Room at the House of Lords on 3 July, when the 29th annual report was submitted. The report makes it clear that progress in cancer research continues in many institutions and in many laboratories throughout the British Commonwealth. It also makes it obvious that the role of the chemist has grown much more important in recent years. Wherein a few years ago the reports were mainly concerned with biological work, now they are more concerned with chemistry.

Difficulties of Specialisation

In proposing the adoption of the report, Sir Daniel Davies, K.C.V.O., M.D., F.R.C.P., said it was becoming increasingly difficult to be versed in all the specialised knowledge that came to light. Today, perhaps it might be said that no one brain could encompass the whole cancer field. It was not easy for a physician to understand all the reports of the chemists and the physicists and the radium experts.

Research, as contained in the report, included the growth of mushrooms, a paper from the Atomic Station in Chalk River, the production of cancer of the bladder in mice, the estimation of arsenic and benzpyrene in town air, the metabolism of nucleic acid, as well as intense studies of the cellular changes in embryonic and cancerous tissues.

There were now in all probability more non-medical workers than medical men in the army of cancer researchers. Never before had so many scientifically trained hands contributed to this task; but he thought it was in no small measure in this country, due to the readiness of the Scientific Advisory Committee in promoting all new approaches that such a large number of non-medical scientists could be seen hand in hand, working in this common cause.

Scientists exploring new fields in physics and atomic energy were not as free to intercourse with their colleagues of other countries as was the custom of scientists in days gone by, for their work today and the security of their country were delicately intertwined. But here was work which need have no restraint or secrecy, for it promoted the preservation rather than the destruction of man.

The new tools of the scientist, the cyclotron, the ultra-centrifuge and the electron microscope, all made it possible for the further and far more detailed study of the cancer cell; and if the secret did lie here in that cell, with the development of microchemistry, cytochemistry, isotope tracers, who knew what new and profitable knowledge would be ours.

For many years the laboratory worker had been able to study cancer in the animal; a cancer artificially induced by chemical agents; a cancer transmitted from one animal to another; and a cancer which might develop spontaneously in certain species, and valuable information had accumulated over the years.

Now, with the co-operation of biochemically minded persons it has been shown that cancer and normal tissue had important chemical differences. One of these was the difference in the manner of breaking down carbohydrates to release energy, and another was the difference in tissue enzymes.

Who would have thought it possible that the enzyme activity of cellular particles could ever have been assayed? This work, combined with the studies of intracellular structures, made possible by the electron microscope, might still yield further depths of knowledge.

Ramsay Fellowships

THE Ramsay Memorial Fellowships Trustees have made the following awards of new Fellowships in chemistry for 1952-53:—

Mr. D. Clark, a British Fellowship of £500 a year at the University of Birmingham; Mr. R. F. Webb, a British Fellowship of £500 a year at the University of Cambridge; Dr. G. S. Trick, a Canadian Fellowship at King's College, London; Mr. Juan Llopis Mari, a Spanish Fellowship at King's College, London; Mr. R. O. Steiner, a Swiss Fellowship at the Imperial College of Science and Technology, London; Mr. David R. Lide, a United States Fellowship at the University of Oxford.

The trustees have renewed the following Fellowships for the same year: Mr. L. E. Lyons (British Fellowship) at University College, London; Mr. James Jack (Glasgow Fellowship) at the University of Cambridge; Dr. Serafin Novoa (Spanish Fellowship) at the University of Oxford.

HOME

Another Victim

The gas (arseniuretted hydrogen) which overcame six workmen on 20 June, has claimed a second victim with the death in Bootle General Hospital of Stephen Jones, aged 33, of Tuscan Street, Seaforth. The first victim was James Ellison, aged 32, of Hornby Boulevard, Litherland. The other four men are still in hospital. They were employed by William Harvey and Co., Ltd., tin smelters, Altcar Road, Bootle (Lancs.).

North-West Representatives

The Watford Chemical Co., Ltd., have announced that Gordon & Martin Limited, 2 China Lane, Piccadilly, Manchester, are now officially representing them in the North West area of England.

Chemical Society Research Fund

It has been announced that application for grants from the Chemical Society's Research Fund will be considered in November and should be submitted on the appropriate form not later than 15 November, 1952. Applications from Fellows will receive prior consideration. The Research Fund provides grants for the assistance of research in all branches of chemistry and about £700 per annum is available for this purpose. Forms of application, together with the regulations governing the award of grants, may be obtained from the general secretary, Chemical Society, Burlington House, London, W.1.

BTH Fellowships

The British Thomson-Houston Company is now awarding annual Engineering Research Fellowships. The awards are open to Honours graduates who are in their last year of apprenticeship with the Company. The holder of a Fellowship will engage in engineering research for a limited period (one to three years) either wholly within the Company or partly within the Company and partly at a University. He will work under the supervision of a senior engineer of the Company and under the guidance of a Research Fellowship Panel which includes senior executives of BTH, Professor E. B. Moullin and Professor Willis Jackson.

CRL Open Days

Open Days are being held at the Laboratory from 23 to 26 September, 1952. Industrial firms wishing to send representatives and who are not already on the mailing list should apply to the Director, before 31 August, for invitations to the following sessions: 23 September (2.30-5.30 p.m.), 25 and 26 September (10.0 a.m.-1.0 p.m., or 2.30-5.30 p.m.).

New Oxygen Plant

A site of 36 acres at Brinsworth, near Rotherham, has been acquired by the British Oxygen Co., Ltd., for a new oxygen producing plant. It is hoped to start building this year. When the plant is completed the company's output of oxygen in Sheffield and Rotherham will be about doubled. The cost of the building will probably exceed £250,000, apart from the cost of piping supplies direct to Sheffield and Rotherham steelworks, which may be carried out in the future.

Copper Price Raised

The Ministry of Materials has announced that from 5 July the price of electrolytic copper was increased from £281 to £287 a ton, delivered consumers' works. Discounts and premiums remain unchanged. The Ministry of Supply will make corresponding adjustments in the controlled prices of scrap and secondary metal.

Students from Chile

The British Council arranged a programme for a party of Chilean chemical engineering students who visited this country from 26 June to 3 July in the course of a European tour. They visited Messrs. Johnson Matthey's refineries at Brimsdown and research laboratories at Wembley; Messrs. W. Edwards & Company, manufacturers of high-vacuum equipment, at Sydenham; Messrs. Hilger & Watts, Camden Town, manufacturers of optical and spectrographic equipment; the Walhamstow instrument factory and Chadwell Heath research departments of Messrs. Baird & Tatlock (London), Ltd.; and Messrs. Hopkins & Williams, Ilford, manufacturers of laboratory chemicals.

OVERSEAS

Producing Sulphate

Portugal is producing ammonium sulphate for the first time, largely as a result of hydro-electric developments. Two plants have been installed, one in the north of Portugal, with an annual capacity of 22,000 tons, which will probably be doubled by 1954. The other is in the centre of the country and has a total capacity of 40,200 tons. Together they will have a total potential production of just over 90,000 tons. Present needs of metropolitan Portugal are estimated at 110,000 tons.

Investigating Potash

The Western Australia and Commonwealth Governments and the University of Western Australia are co-operating in the investigation of more economical production of potash from West Australian alunite. During the war, large quantities of potash were produced from alunite, but the local industry ceased operations because it could not compete with the imported product. Investigations centre on a new production method to increase output and lower costs sufficiently to permit West Australian potash to meet overseas competition.

Another Sulphur Plant

The Real Compania de Minas, is constructing a new factory at Torrelavega in Spain to extract sulphur from pyrites, blends and galena from their Reocin mines. Production will be an estimated 20,000 tons a year of sulphur in powder and work will begin in 1953. Production of sulphuric acid will be increased, and an appreciable volume of arsenic and other sub-products obtained.

Ammonia Plant

The American Cyanamid Company is erecting a $50,000,000 plant ten miles upstream from New Orleans as a nucleus for a major chemical development. This will be the company's first attempt to make use of natural gas instead of coal and coke. Products will include anhydrous ammonia, ammonium sulphate, acetylene, and acrylonitrile—a basic intermediate for certain types of synthetic rubber with wide uses in the plastics field. This development is part of the U.S. Department of Agriculture's plan to expand nitrogen plants.

Swiss Get Order

The Government of Ceylon some time ago invited tenders for the construction of a caustic soda, chlorine and hydrogen plant. It is now reported that after heavy international competition, the order has gone to the Louis De Roll Co., of Zurich, which previously had built a plant for the production of fatty alcohols in Ceylon.

Nickel Substitutes Sought

The present shortage of nickel has resulted in a search being made in Australia for alternative coatings that have corrosion-resistance, and attractiveness. Pooling of information showed that alternative coatings which had been used by the trade included speculum (55 per cent copper, 45 per cent tin), bronze (90 per cent copper, 10 per cent tin), tin-zinc (80-20) and white brass (80 per cent zinc, 20 per cent copper).

Canadian Discovery

Potash has been revealed in the first of a series of exploratory potash wells in Saskatchewan for Western Potash Corp., Ltd., with 13 ft. of the mineral indicated by the drilling time record. The company has announced locations for the next two of its series of wells in the current exploratory programme. Top of the salt formation was found at a depth of 3,616 feet, and the well was bottomed at 3,675 feet. Coring was carried out in the salt and samples were taken at the potash horizon. The company is sidetracking and taking a wire line core of the potash bed.

Cortisone Fermentation Plant

The discovery of a method whereby progesterone can have an oxygen atom introduced on to its 11 position by a one-step fermentation process has led the Upjohn Company of Kalamazoo, Michigan, to apply for a certificate of necessity to the Defence Production Authority to erect a $3,300,000 plant for its production. Progesterone can be made synthetically from vegetable and animal sources. The inventors of the process claim that the process can be applied to a variety of sterols. The mould responsible for the conversion is of the genus *Rhizopus*, family *Mucoracea*, and order *Mucorales*.

• PERSONAL •

MR. L. A. C. BARTLETT, A.M.I.Mech.E., Commercial Director of George Kent Ltd., London and Luton, left for India and Pakistan on 5 July on a survey of future export possibilities. He will visit Bombay, Delhi, Lucknow and Karachi. On his return journey he will call at Istanbul, and is expected back on 21 July.

MR. DAVID MAINWARING-EVANS, who has been Educational Publicity Officer at British Celanese Ltd. since 1945, has been appointed Press and Public Relations Officer to the British Rayon and Synthetic Fibres Federation. He will also direct the Federation's educational activities.

Mainwaring-Evans, who is 48, is a Science graduate of London and a member of University Convocation. He has spent most of his life in the textile trade or in trade journalism. In 1937, he was a founder member of the International Wool Secretariat Staff and until 1945 was its first P.R.O. and education officer.

MR. F. R. HEAD, J.P., A.M.I.I.A., has been appointed manager of the new Lea Works, Luton, of George Kent Ltd. He was formerly Production Controller at the firm's Biscot Road Works in Luton. The Lea Works adds 63,000 square feet to the factory floor area of George Kent Ltd.

MR. R. H. HOUSTOUN, managing director of The Thermal Syndicate Limited, Wallsend, retired on 30th June, and MR. F. I. EDWARDS has been appointed in his place from 1st July.

WILLIAM H. WARD, vice-president of E. I. du Pont de Nemours and Company, Inc., was elected chairman of the board of the Manufacturing Chemists' Association, Inc., at the Association's 80th annual meeting held recently at White Sulphur Springs, West Virginia.

Mr. Ward succeeds CHARLES S. MUNSON, chairman of the board of Air Reduction Company, who was elected president of the Association. H. W. FISHER of Standard Oil Company (N.J.) was named vice-chairman.

JOHN E. MCKEEN and W. S. RICHARDSON were elected vice-presidents. Mr. McKeen is president of Chas. Pfizer and Company, Inc. Mr. Richardson is a vice-president of The B. F. Goodrich Company. J. W. MCLAUGHLIN, vice-president of Union Carbide and Carbon Corporation, was re-elected treasurer. M. F. CRASS, Jr., continues as secretary.

New directors elected for the term expiring 31 May, 1955, are: E. T. ASPLUNDH, Columbia-Southern Chemical Corporation; PAUL L. DAVIES, Food Machinery and Chemical Corporation; F. J. EMMERICH, Allied Chemical and Dye Corporation; J. W. MCLAUGHLIN, Union Carbide and Carbon Corporation; CHARLES S. MUNSON, Air Reduction Company, Inc.; DAN RUGG, Koppers Company, Inc., and J. A. SARGENT, Diamond Alkali Company.

PROFESSOR G. M. NABAR, M.Sc.Tech., Ph.D., Professor of Textile Chemistry at the University of Bombay, India, has been elected a Fellow of the Textile Institute. Professor Nabar, an authority on the oxidation of cellulose and on the photo-chemical behaviour of vat-dye-cellulose systems, has been largely responsible for the progress of textile processing in India. He is a joint patentee of several new methods of dyeing and processing of textile materials.

Obituary

MR. IAIN CAMERON, managing director of International Bitumen Emulsions, died suddenly on 2 July at his home in Maidenhead. He was 53. Mr. Cameron was on the Boards of many of the subsidiary companies of International Bitumen Emulsions and was also a director of British Runways and General Contractors, a subsidiary of En-Tout-Cas.

A local director of Thos. W. Ward Ltd., Sheffield, MR. C. LESLIE FRY, died on Thursday, 26 June, while on holiday in the Scilly Isles, aged 52. Mr. Fry, who was unmarried, joined the firm on leaving school and had been with them for 38 years.

He was also joint managing director of Low Moor Best Yorkshire Iron Ltd., joint assistant managing director of the Wolverhampton Steel and Iron Co. (1946) Ltd., and a director of Birchley Rolling Mills Ltd.

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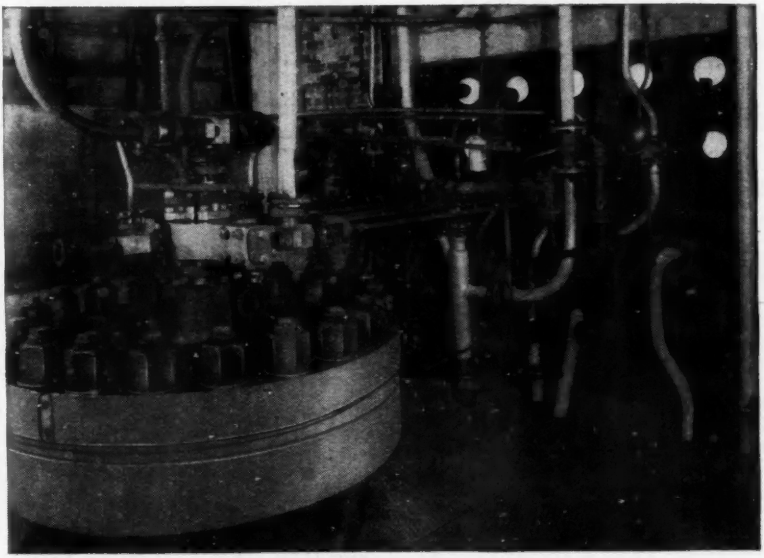

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Publications & Announcements

HISTORICAL development of Geiger-Müller counters from the first original type up to present-day designs is described by N. Warmoltz in *Philips Technical Review* (Vol. 13, No. 10) published monthly in English, French, German and Dutch by Philips Research Laboratories. In another article J. M. Stevels shows how in many cases theoretical conceptions as to the structure of glass are serving as a guide to the development of new materials.

* * *

PROPERTIES of sodium and information on its safe handling and use are given in Chemical Safety Data Sheet SD-47, 'Sodium, Sodium Metal, Metallic Sodium', published by the Manufacturing Chemists' Association, Inc., 15th and H Streets, Washington 5, D.C. (Price 25 cents). Among the principal precautions set forth in this Data Sheet are: avoid contacts with water, avoid contact with chlorinated hydrocarbons and solid carbon dioxide; avoid use of fire extinguishers containing carbon tetrachloride, water or acids; avoid using steam on sodium fires or for heating sodium reaction vessels. Instructions are also given on handling of fires.

* * *

A NEW glove specifically designed for use by laboratory personnel has just been introduced. Messrs. James North & Sons, Ltd., Hyde, Cheshire, now present a PVC fabric-supported laboratory glove. These gloves are specifically designed for lab. workers handling corrosive chemicals, test equipment or pilot scale plant. It is claimed that durability is exceptional and that these gloves afford the flexibility and sensitivity of touch essential for laboratory operations. Produced in a red colour designed to alert the operative to a sense of caution, and highly resistant to almost all chemicals and abrasion, these gloves are individually pressure tested before despatch, ensuring protection of the user from chemicals handled. Attention is drawn by the manufacturers to their technical advisory service and prospective users are invited to avail themselves of the research facilities maintained by Norths in their laboratories. Norths Technical Bulletin No. 4 relating to their PVC fabric supported laboratory glove is available free.

COMPLETION of the preliminary stages of a modern refinery project in Australia are recorded by the Anglo-Iranian Oil Co., Ltd., in the June issue of *Naft*. The site chosen is at Kwinana on Cockburn Sound, a few miles south of Fremantle. The refinery will have an input capacity of 30,000 tons and will produce a wide range of products. An announcement is made at the beginning of this issue of the magazine, that as BP is the recognised mark of the company wherever it operates, it has been decided to change the name of *Naft* to *The BP Magazine* as from next August.

* * *

NOW that the zinc position is easier, publication of the *Zinc Bulletin* is being resumed by the Zinc Development Association and, as previously, it will be issued three or four times a year. The current issue (No. 9), is mainly devoted to various types of zinc coating—a subject of considerable importance now that steel has to be conserved in the best possible way. Another article describes the manufacture, properties, and widely varying industrial uses of zinc oxide. Copies of the *Bulletin* may be obtained on request.

* * *

VITREOSIL hydrogen discharge lamps are the subject of a small pamphlet recently issued by the Thermal Syndicate, Ltd. Attractively coloured, this described the two sizes of lamp, their spectral characteristics, life, patterns available, and instructions for operating them from A.C. or D.C. supplies These lamps provide a continuous source of ultra-violet radiation for use in spectrometric investigations of all kinds.

* * *

FOUR new seals, two Compact (types 6 and 7), and two Monitor (types 8 and 9) are introduced by Crane Packing, Ltd., Slough, in a new and revised edition recently issued of its booklet 'Mechanical Seals'. The first two are designed for low-pressure applications and the last two for mounting adjacent to ball and roller races on other bearings. The treatise on 'Mechanical Seal Design' is again included in the middle of the book, and has been revised and brought up to date. Copies may be obtained from the company's seals division at Slough, Bucks.

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THE development of some man-made textile fibres is the subject of a small book published by the Textile Institute recently giving three of the papers presented at the 1951 Annual Conference of the Institute on this subject. These three papers were discussed together, and their inclusion in one book affords an excellent opportunity to students (and others), to survey the entire history and development of synthetic fibres without going back beyond the papers of 1951. The book is given an able foreword by Sir William Palmer, K.B.E., C.B. (Chairman of the British Rayon and Synthetic Fibres Federation), and it is very well produced on art paper. Excerpts from some of the patent specifications are of great importance, and pictures of historic apparatus in them will now be more readily accessible than heretofore.

* * *

A SATISFACTORY substitute for scarce nickel in nickel plating preparatory to chrome plating has been announced by Metal Processes, Ltd., Erdington, Birmingham, after tests over a long period. The new finish, which was announced earlier, is known as 'Niklit' and consists of a simple dipping process as opposed to the usual electrolytic deposition of the nickel coating. A large variety of parts has been tested in Birmingham and the Midlands during the last six months.

* * *

INFORMATION concerning the United Kingdom iron and steel industry in all its aspects is contained in the 'Statistical Year Book for 1951,' Part I, now published by the British Iron and Steel Federation. Besides production, finished steel deliveries and the use of raw materials, the tables give details regarding imports and exports, prices, stocks, and employment in the industry. For the convenience of the general reader two summary tables included at the beginning of the volume give information over a long period of years. The first brings together the main statistical series relating to iron ore, coke, pig iron, scrap and steel from 1920-1951. The second sums up information regarding the supply and disposal of steel from 1901-1951. It shows, for example, that the supply of steel available for consumption in the U.K. (excluding exports) rose from an annual average of 5,050,000 ingot tons in 1921-25, to 9,240,000 tons in 1938, and 14,500,000 tons last year.

THE Chemical Engineering Group of the Society of Chemical Industry has published its *Proceedings* for 1950 (Vol. 32). These comprise papers read to the Group during 1950, as well as an account of the Annual Meeting and the address given to it by the Rt. Hon. The Lord Webb-Johnson. A list of officers and committee for 1949-50 and for 1950-51 is also given.

* * *

DETECTION of superficial and subcutaneous flaws for ferrous materials where the test-piece can be magnetised were recently demonstrated by the Manchester Oil Refinery, Ltd. (THE CHEMICAL AGE, **66**, 900). A new leaflet describing the principle of magnetic flaw detection and the application of its 'supramor' electro-magnetic flaw detection ink, is now available from the company.

* * *

WARERITE Limited (a unit of Bakelite Ltd.) have published a pamphlet describing the use of their range of laminated plastics in ships. These are shown in sundry photographs in use on bulkheads, tables, and so forth, in various compartments of the ship. Bakelite Limited have also produced a booklet, on their phenolic moulding materials.

* * *

A BOOKLET issued by the B.S.A. group of companies describes porous stainless steel filters now being made by the company. The B.S.A. Group Research Centre has evolved a new method of producing low carbon stainless steel powder of the 18/8 variety—highly resistant to most acids except hydrochloric—and by accurate control of subsequent processing have produced a uniform compact of controlled porosity. The method of manufacture, due to press and furnace capacity, at present imposes a limit on the size of unit compacts which can be produced, the largest available industrial sheet having a surface area of 54 sq. in. A wide range of thicknesses is, however, available. Probable important applications are expected to include the filtering of reaction products from fluidised catalysts, enabling complete recovery of catalyst, removal of antibiotic contaminants, filtering in air lines and main purified water lines, and possibly as flow surge suppressors. The booklet now published gives permeability coefficients of the various pore sizes, flow characteristics, design requirements, etc. These filters should prove most valuable in the chemical industry.

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Commercial Intelligence

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Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

SOLO LABORATORIES LTD., London, E.C., chemical manufacturers. (M., 12/7/52.) 12 June, charge, to Barclays Bank Ltd. securing all moneys due or to become due to the Bank; charged on 103 Walmer Road, Kensington, W. *Nil. 31 December, 1949.

Satisfaction

BRITISH CELANESE LTD., London, W. (M.S., 12/7/52.) Satisfaction 12 June, of Trust Deed and supplemental deed registered 2 October, 1943 and 8 November, 1944, to the extent of £4,132.

Increases in Capital

The following increases in capital have been announced: J. M. COLLETT & CO., LTD., from £65,000 to £75,000; DARCY PRODUCTS, LTD., from £100 to £5,000.

New Registrations

Wilson and Woods, Ltd.

Private company. (509,150). Capital £100. Manufacturers of chemicals, insecticides, disinfectants, etc. Directors: E. Wilson, F. J. Woods, J. R. Wilson and K. Wilson. Reg. office: 21 High Road, Willesden Green, N.W.10.

Worksop Chemicals Ltd.

Private company. (509,286). Capital £50. Distillers of solvents and other chemicals. Directors: C. N. Norton and R. Beetham. Reg. office; Hartshead Chambers, Hartshead, Sheffield, 1.

Company News

Coalite and Chemical Products, Ltd.

The chairman's statement of the Coalite and Chemical Products Company reports a record trading year. All Coalite plants operated to capacity, and the benefit of the new units was increasingly felt through the year—units made possible by the ploughing back of profits into the business. A new battery of retorts was commissioned last October and a further new battery is scheduled for building. Some difficulty was experienced at the Bolsover works through the temporary (it is to be hoped) failure of the Deep Hard seam at the adjoining colliery, but coal from other sources was readily made available by the National Coal Board. As far as operating costs are concerned, the company passed through the worst phase of the inflationary spiral to date. The market for the company's chemical products was extremely good. In some cases exports had to be curtailed at the request of the Government to meet increased home demand created by rearmament.

Reichhold Chemicals, Ltd.

Arrangements have been made for the placing of 280,000 6½ per cent £1 redeemable preference shares and 469,399 ordinary 5s. shares in Reichhold Chemicals, Ltd., at about 20s. for the preference and 7s. 6d. for the ordinary. The company has been formed to acquire rather more than 90 per cent of the capital of Beck Koller & Co. (England) and the whole of the capitals of James Beadel & Co., Vinyl Products and Vinatex. These four firms are engaged in the manufacture and distribution of synthetic resins and resin compounds, emulsions and synthetic resin polymer solutions. Beck Koller is the British offshoot of Reichhold Chemicals, Inc., of Detroit, which is claimed to be the largest manufacturer of synthetic resins in the world, and which will hold a substantial interest in the new English company. Combined profit of the four companies for 1951 amounted to £227,422 before taxation. Directors of the holding company expect to pay an ordinary dividend of 13½ per cent for 1952, giving a yield of 9 per cent at the placing price of 7s. 6d. The placing was sponsored by Bentworth Securities, Ltd.

Change of Name

It is proposed to change the name of the Eaglescliffe Chemical Co., Ltd., of County Durham, to 'The Eaglescliffe Chemical Group, Ltd.'

Belgian Chemicals Record

BELGIAN chemical exports totalled nearly 10,800,000,000 francs (about £85,000,000) in 1951, giving the industry its greatest export year.

Most of the exports consisted of chemical fertilisers, although exports of industrial chemicals, paints, varnishes and medicines also reached record totals, according to figures published by the Belgian Government.

Exports of chemical fertilisers last year totalled 2,796,208 tons, 20 per cent above the figure for 1950. They were valued at 4,800,000,000 francs (about £33,000,000) of which Western Europe received 62 per cent.

Exports of industrial chemicals of both organic and non-organic types totalled 474,228 tons and were valued at 2,600,000,000 francs (about £19,000,000), Western Europe again received most of these exports.

The value of paints and dyes exported last year was about 90 per cent over the figure for 1950. In 1951, 78,737 tons of these chemicals were exported realising 1,100,000,000 francs (about £7,800,000).

Market Reports

LONDON.—Trading conditions in the industrial chemicals market have been fairly good for the season although buyers are still reluctant to cover more than their immediate requirements. The volume of overseas inquiry is keeping up to recent levels, and here as well as for the home market, the trend is expected to be towards some improvement in activity.

The general price position has remained steady and there have been no important changes on the week.

In the coal tar products market there has been a good call for road tar, pitch and the creosote oils whilst the home inquiry for cresylic acid remains fairly good.

GLASGOW.—During the past week, the general chemicals market in Scotland has been reasonably steady, the latter part of the week showing a slight increase, possibly on account of the approaching holiday periods.

Little or no change can be reported for the export market.

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Three recessed plate type **FILTER PRESSES** by Manlove Alliott, with 60 plates 24 in. sq., 1 in. thick. Hand operated ratchet and pinion closing gear.

S.J. copper **TILTING PAN** by Collier, 30 in. diam. by 24 in. deep. C.I. jacket to 12 in. depth. Hand tilting.

Two 40-gal. Kellis copper S.J. tilting **BOILING PANS.** 30 in. diam. by 26 in. deep. C.I. jacket for pressure 80 lb. sq. in. Hand tilting.

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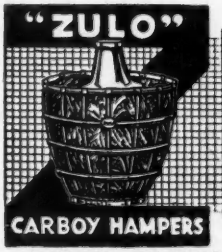

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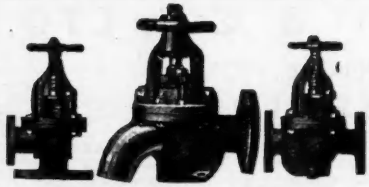

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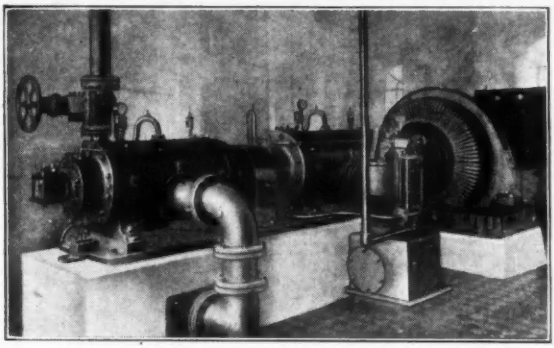

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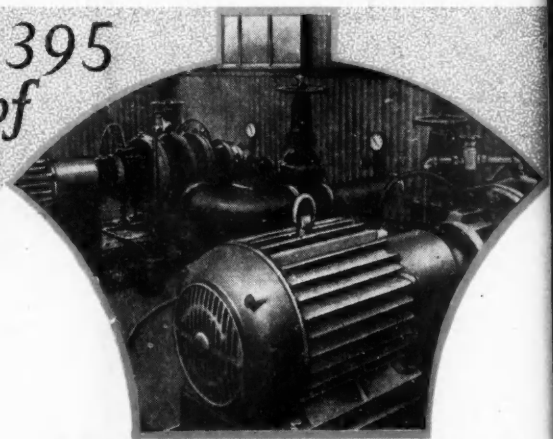

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